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# Sand Creek Watershed

Harvey and Marion Counties

Kansas

# Final Environmental Impact Statement

Prepared by: United States Department of Agriculture
Soil Conservation Service

Salina, Kansas 67401

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Sand Creek Watershed

Harvey and Marion Counties, Kansas

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FINAL ENVIRONMENTAL IMPACT STATEMENT

JUL 271976

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CATALOGING - PREP.

State Conservationist

Soil Conservation Service

Sponsoring Local Organizations

Sand Creek Watershed Joint District No. 68 Newton, Kansas 67114

> Harvey County Conservation District 500 Meridian Road Newton, Kansas 67114

> Marion County Conservation District Box 177 Marion, Kansas 66861

City of Newton, Kansas 67114

May 1975

PREPARED BY

UNITED STATES DEPARTMENT OF AGRICULTURE

Soil Conservation Service

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#### USDA ENVIRONMENTAL IMPACT STATEMENT

Sand Creek Watershed Harvey and Marion Counties Kansas

Prepared in Accordance with Sec. 102 (2) (C) of P. L. 91-190

#### II. SUMMARY

- I. Final
- II. Soil Conservation Service
- III. Administrative
- IV. Description of Project Purpose and Action

A project for watershed protection, flood prevention, and recreation in Harvey and Marion Counties, Kansas, to be implemented under authority of the Watershed Protection and Flood Prevention Act (P. L. 566, 83d Congress, 68 Stat. 666), as amended.

V. Summary of Environmental Impact

Soil losses in the watershed will be reduced 62%. Floodwater and sedimentation damages will be reduced on 4,619 acres of flood plain land. Flood protection in Newton will be raised to the 100-year flood frequency level. The detention dams, floodwater retarding structures, and the multiple-purpose reservoir will increase landscape diversity, improve fishery resources, and provide additional feeding and resting sites for waterfowl. There will be 1,195 acres for a recreation and wildlife management area, including a 195-acre reservoir for water-based recreation and warm-water fishing. Rural area development will be advanced through increased farm incomes and employment opportunities, higher land values, decreased flood expenses, and a more stable economy.

Agricultural and terrestrial wildlife habitat use of 250 acres will be eliminated by sediment pools behind reservoirs; detention dams will eliminate these uses on 228 additional acres. Agricultural and terrestrial

wildlife habitat uses will be interrupted and reduced on 572 acres by periodic flooding of reservoir retarding areas; 831 acres behind detention dams will likewise be affected. These uses will be largely eliminated on 127 acres to be incorporated into dams and spillways; there will be some revegetation on these areas, however. Removal of 9 acres of trees will be required. An estimated 15 persons will be eligible for relocation payments. Traffic, litter, and noise will increase around the recreation area of the multiple-purpose reservoir.

#### VI. List of Alternatives Considered

- A. Dry-pool storage behind the floodwater retarding structures
- B. Accelerated land treatment only
- C. Land treatment and urban flood plain zoning
- D. Land treatment and the multiple-purpose structure
- E. Land treatment and three floodwater retarding structures with no recreational development
- F. The multiple-purpose structure only
- G. A single-purpose recreation structure only
- H. Land treatment, the multiple-purpose structure, and urban zoning of flood plain land
- I. Land treatment, a single-purpose recreation structure, and purchase of agricultural flood plain lands
- J. Land treatment and purchase of flowage easements on 400 acres of flood plain scour channel
- K. Land treatment, a single-purpose recreation site, and flood plain insurance
- L. No action

#### VII. Agencies from Which Written Comments Were Received

- U.S. Department of the Army, Corps of Engineers
- U.S. Department of Health, Education, and Welfare
- U.S. Department of the Interior
- U.S. Department of Transportation

Environmental Protection Agency

Governor of Kansas

Budget Division, Department of Administration, State of Kansas (Clearinghouse)

Advisory Council on Historic Preservation

## State Historic Preservation Officer

VIII. Draft Statement Transmitted to CEQ on <u>December 13, 1974</u>.

Date

#### III. PROJECT IDENTIFICATION AND ENVIRONMENTAL SETTING

# A. <u>USDA Soil Conservation Service Final Environmental Impact</u> Statement for Sand Creek Watershed, Kansas

Installation of this project constitutes an administrative action. Federal assistance will be provided under authority of P. L. 83-566, 83d Congress, 68 Stat. 666, as amended.

#### B. Sponsoring Local Organizations

Sand Creek Watershed Joint District No. 68, Kansas Harvey County Conservation District, Kansas Marion County Conservation District, Kansas City of Newton, Kansas

#### C. Project Purposes

#### 1. Watershed Protection (Conservation Land Treatment)

A major goal of project sponsors and the Soil Conservation Service is to obtain 100% cooperation of the landowners and operators with the county conservation districts' land treatment program for the proper management of soil and water resources. Land treatment measures are needed on an additional 22,970 acres of cropland, 3,720 acres of rangeland, and 300 acres of woodland to reduce average annual soil loss to allowable levels. The allowable soil loss for typical upland soils in cropland in this watershed is 4 tons/acre/year. 1/2 (See list of references, p. 185).

Proper use and management within each land use capability class is an important land treatment objective. Sponsors desire to manage croplands through implementation of basic conservation practices: conservation cropping systems, stubble mulching, minimum tillage, contour farming, and the installation of gradient terraces, diversions, grassed waterways, and drainage systems. The sponsors recognize the need for improvement in land uses by converting cropland to rangeland where appropriate and by improving management practices on existing rangeland. Sponsors desire to see rangelands managed under proper grazing use, planned grazing systems, brush management, and the strategic

placement of stock ponds. Watershed woodlands are to be managed so that they are vigorous stands, fully stocked with native species, with undisturbed ground cover. Land treatment measures to be employed include woodland improvement, windbreak and shelterbelt planting and renovation, hedgerow replacement, special purpose plantings (such as those species valuable as food or cover for wildlife), and fire protection.

#### 2. Flood Prevention

As stated in the application for assistance, one of the primary objectives of the sponsors is to reduce flooding and flood damages to rural and urban areas. The continuation and acceleration of land treatment measures in conjunction with the construction of structural measures should provide the protection necessary to meet this goal. Detailed planning information about flood problems and potential solutions formed the basis for sponsors and the Service to agree that a minimum of 45% reduction in floodwater damage in agricultural reaches is consistent with sponsors' objectives.

Sponsors state in the application for assistance that the proposed project should provide additional flood protection for the cities of Newton, North Newton, and Sedgwick. The objective for Newton and North Newton is to eliminate overbank flooding for a 100-year frequency storm event by supplementing the U.S. Army Corps of Engineers' channel work. Sponsors also wish to reduce flooding in Sedgwick to a frequency equal to or less than that occurring due to overflows of the Little Arkansas River.

#### 3. Recreation

Sponsors originally expressed a willingness and desire to develop structure sites for recreational purposes in order to provide fishing, hunting, swimming, picnicking, boating, water skiing, and camping facilities for watershed residents. Later in planning this goal was modified to call for a high level of recreational development at the largest available site.

An objective in the application for assistance is that the fish and wildlife resources within the watershed should be enhanced through land treatment measures, land use conversions, and establishment of impounded water. It was later agreed that where losses unavoidably occur due to installation of structural measures, they are to be mitigated as fully as possible.

#### D. Planned Project

#### 1. Land Treatment Measures

Resource management systems will be implemented on 22,970 acres of cropland, 3,720 acres of rangeland, and 300 acres of woodland. The resource management systems will include all practices that are needed for the desired use of a particular land area. Land use conversions will include 1,462 acres of cropland to: hayland (950 acres), pastureland (80 acres), rangeland (80 acres), wildlife and recreation land (32 acres), woodland (10 acres), and other uses (310 acres). In addition, 325 acres of rangeland will be converted to cropland (40 acres) and to wildlife and recreation (285 acres).

Cropland is used primarily for the production of adapted cultivated and close-growing crops for harvest, alone or in association with seed crops. The basic conservation practices needed on cropland in Sand Creek Watershed are conservation cropping systems, stubble mulching, minimum tillage, contour farming, and the installation of gradient terraces, diversions, grassed waterways, and drainage systems. (See Appendix L, p. 150 for a description of all planned land treatment measures).

Rangeland is used for grazing livestock and big game animals. The natural plant community is dominated by grasses, grass-like plants, forbs, and shrubs. The primary practices needed on rangeland include proper grazing use, planned grazing systems, brush management, range seeding, and stockwater pond and detention dam construction.

Woodland is used primarily to produce adapted wood species, to provide tree cover to protect fields and farmstead from inclement weather, and to supply watershed protection, wildlife habitat, and landscape diversity. In order to maintain or improve hydrológic conditions of woodland sites, areas must support vigorous, fully stocked stands of trees with undisturbed ground cover. Watershed benefits from woodland management and proper land use of forest sites will be sustained by realizing the maximum economic returns consistent with site capabilities. To obtain these objectives, the following land treatment measures will be employed on woodlands: woodland improvement systems, windbreak and shelterbelt planting and renovation, hedgerow replacement or renovation, fire protection, and special purpose planting.

A forestry work plan was developed for the Sand Creek Watershed by the Kansas State and Extension Forester, in cooperation with the Forest Service of the U.S. Department of Agriculture. Forestry technical assistance provided through the existing Cooperative Forest Management Program will adequately serve the needs of the watershed woodlands throughout the life of the project.

The watershed area is protected by rural fire districts. Equipment procurement, training in fire fighting and control, and fire prevention education will be continued. Technical assistance for fire control measures will be provided by the Kansas State and Extension Forester through the Cooperative Fire Control Program. No additional funds are needed to maintain the desired level of fire protection. The desired level of protection for Sand Creek Watershed is 0.1 of 1% loss per year on woodlands and 0.5 of 1% loss on grasslands.

As part of the land treatment measures to be installed, the watershed district, in cooperation with the conservation districts, will work with landowners to install approximately 19 detention dams. These dams will control drainage areas ranging in size from 0.29 to 2.62 sq miles. They will help control 25.41 sq miles; of this, 1.37 and 1.24 sq miles will be recontrolled by Structures Nos. 1 and 3, respectively. Water detention storage in these reservoirs will control from 2.40 to 4.00 in. of runoff from the drainage areas. The total estimated flood storage for the 19 detention dams is 3,765 Retarding pools will cover a total of 831 acres. Sediment storage will be provided for yields averaging 0.63 in. from the drainage areas. The total estimated sediment storage for the 19 detention dams will be 854 acre-ft. pools will cover a total of 228 acres. Dam heights will vary from 13 to 31 ft. Volume of earth fill for these dams will range from 9,700 to 78,300 cu yd.

The installation of Structures Nos. 1 and 3 are not dependent upon the installation of detention dams Nos. 119 and 116.

Watershed directors and conservation district supervisors are furnishing part-time assistance to the Soil Conservation Service in an effort to accelerate the installation of needed soil and water conservation treatment measures. The watershed

district has made provisions for a field representative to personally contact individual landowners and operators to urge them to cooperate in establishing conservation practices on their farms. His duties include informing the people about the watershed program and its progress. It is important for landowners and operators to understand that land treatment measures not only benefit them individually but also are necessary prior to establishing the structural phase of the watershed program.

An educational program is planned to inform rural residents of the watershed of the economic and wildlife benefits gained from excluding livestock from woodlands and shelterbelts.

The Mennonite Disaster Units, which have helped generously to clean up Newton and the surrounding area after the more recent floods, have offered to help educate farmers in the headwater region as to the benefits of soil conservation practices. They have offered to hold meetings with farmers of this area to induce them to complete their conservation practices. The members of the unit feel that it is much wiser to help prevent floods than to clean up afterwards.

The watershed district board of directors estimates that land treatment measures can be completed within 7 years.

#### 2. Nonstructural Measures

Requirements of the National Flood Insurance Act of 1968 (P. L. 90-448) and the Flood Disaster Protection Act of 1973 (P. L. 93-234) will serve to prevent further development of flood prone areas in Sedgwick and within the 3-mile extraterritorial limit of Newton. 2.3 Both of these communities will find it necessary to apply for flood insurance and to adopt programs of flood plain management under terms of these laws. Flood plain development within 3 miles of Newton is currently restricted by zoning ordinances. Both Newton and Sedgwick are taking definite steps toward application for flood insurance.

#### 3. Structural Measures

A system composed of two floodwater retarding structures and one multiple-purpose structure with recreation facilities will be installed at locations shown on the Project Map, p. 190.

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Principal spillways of the three structures will be made of reinforced concrete or a material of comparable quality and strength. Each spillway will have a single-stage inlet with an uncontrolled release. Release rates will vary from 23 csm (cubic ft/sec/sq mile) to 38 csm, which will not exceed present downstream channel capacities. Regulations of the Kansas Division of Water Resources require natural streamflow to be passed through the dam and reservoir to satisfy downstream water rights. Structure No. 1 will have an 18-in. diameter pipe and Structures Nos. 2 and 3 will have 8-in. diameter pipes with control valves. installed at the bottom of the outlet works. These pipes will permit releases regardless of reservoir storage elevation. Features of a typical dam with a drop inlet conduit (representative of Sites Nos. 2 and 3) are shown on p. 189. Site No. 1 is similar with addition of an impact basin at the principal spillway outlet.

All dams will be earth-fill structures with vegetated emergency spillways provided to release runoff safely past the embankment when reservoir storage capacity and normal release rates have been exceeded. The chance of operation in any 1 year for the emergency spillways is 4% on the two floodwater retarding structures and 1% on the multiple-purpose structure.

Wellington shale occurs as irregular bedrock at the three reservoir sites. Soils in the abutments are 3 ft to 10 ft deep. Soils in the flood plains of Sites Nos. 2 and 3 are 6 ft to 10 ft deep; and in the flood plain of Site No. 1, soils are 8 ft to 25 ft deep. The principal spillways at Sites Nos. 2 and 3 will be located on approximately 6 ft and 8 ft of yielding soils overlying nonyielding shale. The principal spillway at Site No. 1 will be located on approximately 20 ft of yielding soils overlying nonyielding shale.

The main borrow areas at Site No. 1 will be confined to the sediment and recreation pool area. Within limits of material location and availability, the borrow areas will be shaped to allow optimum development of the fishery resource. The main borrow areas at Sites Nos. 2 and 3 will be confined to the sediment pool areas. The borrow material at all sites is silty clay (CL\*).

Floodwater retarding Structures Nos. 2 and 3 will each provide floodwater storage for 3.20 in. of runoff from their drainage areas. The combined surface area of the retarding

<sup>\*</sup> Classification of Soils for Engineering Purposes, ASTM D24-87 (Laboratory), D24-88 (Field).

pools will be 192 acres. Storage will be provided for the expected 100-year accumulations of sediment with sediment storage volume equivalents of 1.05 in. and 0.97 in., respectively. The principal spillway crest of the two structures will be placed at the elevation of the 100-year accumulation of sediment. Total sediment storage volume in the two structures will be 239 acre-ft. The combined surface area of the sediment pools will be 55 acres.

Multiple-purpose Structure No. 1 was also designed for a 100-year life, with 4,209 acre-ft for floodwater retarding storage and 592 acre-ft for sediment storage. The recreation pool will have a full pool surface area of 195 acres 46% of the time. A 145-acre pool will be available for recreational use 80% of the time. Fifty acres will be exposed around the full pool shoreline 20% of the time. The pool will have a maximum initial depth of 24 ft and an average initial depth of 6 ft. The average depth at the end of 100 years is estimated to be 3 ft.

The total capacities of the three structures will be 4,976 acre-ft for floodwater retarding storage, 831 acre-ft for sediment storage and 368 acre-ft for recreation water storage. They will control runoff from 18.9 sq miles, or 19% of the watershed. All of the sediment storage capacity will initially store water.

A total of 1,195 acres of land will be purchased in association with Site No. 1. This land will include 810 acres for recreation use and floodwater detention, and 385 acres located above this area to insure full utilization of the recreational facilities. Flowage easements will be obtained on an additional 50 acres. All borrow areas will be located on purchased land.

Facilities to be installed for the full recreational use of Site No. 1 will include landscaping, signs, access roads, parking areas, utilities, camping and picnicking sites, boat docks and ramps, sanitary and waste facilities, and a swimming beach. Facilities will be designed and installed to be usable by the physically handicapped. One area of the reservoir site will be specifically for wildlife habitat management, with the only installations being access roads, parking facilities, erosion control measures, and a nature and fisherman trail. The arrangement of recreation facilities and wildlife areas is shown on the Public Recreation Development Map, p. 191. See Appendix M, p. 154 for a description of recreational facilities.

Fish and wildlife habitat development measures will include the following: resting native pastures within the fee title area to assist in re-establishment; placing and maintaining tree and shrub plantings at recommended locations (in addition to those adjacent to the dam and spillway); establishing soil and water conservation measures on all of the cropland within the fee title area; leaving as much vegetation in the sediment and recreation pool as possible; constructing brush piles suitable for wildlife with the trees cleared for construction; planting switchgrass within a 2-ft vertical elevation of the recreation pool; reseeding borrow areas to a quick cover crop; and fencing the entire fee title area.

Sponsors will provide public access to recreation facilities at the multiple-purpose reservoir. Sites Nos. 2 and 3 have no likelihood of public recreational use. Access to the sediment pools of the two floodwater retarding structures will be controlled by landowners. All recreational facilities at Site No. 1 will be installed, operated, and maintained to meet or exceed the requirements of state and local public health agencies. In addition, HEW Standards 4 will be used as guidelines. watershed district will notify landowners of the need for sanitation facilities at the two floodwater retarding structures if significant recreation use occurs; they will further notify the State Department of Health and Environment if the landowners do not provide needed sanitation facilities. When sufficient recreational density is demonstrated, the State Department of Health and Environment will designate the multiple-purpose reservoir a "body contact area." 50/ Following this designation, the City of Newton will be responsible for regular monitoring of water quality in the lake in accordance with the state code for class A waters. This requirement does not prohibit use of the lake for body contact water sports prior to such designation.

As a result of the acquisition of land for Structure No. 1, it is estimated that 15 persons on five farm operations will be eligible for relocation payments. Relocation payments totaling \$15,000 are included in the estimated structural cost distribution for this site.

The proposed structures will require clearing 9 acres of woodlands. Sediment pools will inundate 250 acres, 50 acres of which are good wildlife habitat. The remaining acres are largely cropland and rangeland.

Specific measures to mitigate wildlife losses and to enhance habitat have been recommended for each structure site. Maps and descriptions of these measures are included in a report by the U.S. Fish and Wildlife Service. 5/ (See Appendix A, p. 82.) The recommended mitigation measures have been adopted as design features for each site.

Specific odd areas adjacent to Sites Nos. 2 and 3 as designated in the Fish and Wildlife Service report are to be within the permanently fenced area. The dam, spillway, and wildlife areas are to be fenced and seeded to a grass-legume mixture suitable for wildlife. Two-row tree and shrub plantings are to be made in the wildlife areas. Mature trees are to be preserved in wildlife areas where possible.

The dam, spillway, and adjacent wildlife areas of Site No. 1 are to be seeded to a grass-legume mixture suitable for wildlife. Two-row tree and shrub plantings will be made at designated locations adjacent to the dam and spillway. A sharecropping program will be established on designated areas within the fee title area.

Enhancement measures for Sites Nos. 2 and 3 include: seeding cropland within a band 0.5 ft below to 2.0 ft above the normal water surface elevation of the sediment pools to Kanlow switchgrass; encouraging landowners to leave portions of food crops adjacent to the sites unharvested; leaving as much woody vegetation within the sediment pools as possible; constructing brush piles suitable for wildlife using the trees that were cleared for construction; planting borrow areas within sediment pools to a quick cover crop; and recommending additional odd areas and shrub plantings within the permanently fenced area.

Roads cross each end of Structure No. 1; these roads will be raised. In the reservoir area one road will be closed and another will be raised. No roads are affected by Structures Nos. 2 and 3. None of the structures affect pipelines, utilities, or mineral deposits. A record search by the State Corporation Commission and field investigations by Soil Conservation Service personnel did not reveal any abandoned oil or gas wells which were improperly plugged and therefore possible sources of pollution, either in the reservoir areas or upstream from these sites.

The guideline of SCS Engineering Memorandum 66 will be implemented in order to minimize soil erosion and water and air pollution during construction. The need for pollution abatement will be determined on a site-by-site evaluation basis.

Close communication will be maintained with the State Archeologist during project construction so that any finds may be investigated to determine the need for emergency salvage. In accordance with P. L. 86-523, the National Park Service will also be notified of any discoveries.

#### 4. Operation and Maintenance

Land treatment measures will be maintained by landowners and operators of farms on which the measures are installed under agreements with the conservation districts. Conservation district representatives will make periodic inspections of land treatment measures to encourage landowners to perform needed maintenance.

The Watershed District is responsible for operation and maintenance of the 19 detention dams. The District will enter into agreements with the landowners who will perform maintenance as needed.

Technical assistance to landowners and rural fire districts for operating and maintaining forestry and fire control measures beyond the installation period will be provided by the Kansas State and Extension Forester in cooperation with the Forest Service under regular continuing programs.

Agreements providing for operation and maintenance of structural measures and recreation facilities will be executed by the local sponsoring organizations before federal construction funds are made available. These agreements will contain, in addition to sponsor responsibilities for nonstructural and structural measures, specific provisions of CMB Circular A-102 for retention and disposal of real and personal property acquired in whole or in part with P.L. 566 funds.

The two floodwater retarding structures will be operated and maintained by the watershed district. The estimated average annual costs are \$900. Maintenance will be accomplished through hired or contributed labor and equipment, and funds will be obtained from an annual tax levy.

The multiple-purpose reservoir will be operated and maintained, and the associated recreational facilities and fish and wildlife habitat measures will be operated, maintained, and replaced by the City of Newton at an estimated annual cost of \$24,700, of which \$23,100 is for recreational facilities. Useful life will vary for recreation facilities, but an average period of 20

years has been used to compute replacement costs. Funds will be obtained from user fees and an annual tax levy. User fees will not exceed those required to offset initial costs and annual operation and maintenance expenses. When this reservoir is officially designated a "body contact area," the City of Newton will have to meet a minimum sampling requirement for five samples for fecal coliform analysis taken during separate 24-hr periods over each 30-day period. Samples must not exceed a geometric mean of 200/100 ml sample, nor shall more than 10% of total samples during any 30-day period exceed 400/100 ml sample.

Regulations of the Kansas Division of Water Resources require natural streamflow to be passed through the dam and reservoir to satisfy downstream water rights. Structure No. 1 will have an 18-in. diameter pipe and Structures Nos. 2 and 3 will have, in their principal spillway outlet works, 8-in. diameter pipes controlled by valves. These pipes will be for the express purposes of complying with the state regulations and providing sediment and beneficial pool drainage for maintenance and repair. The Sand Creek Watershed District will assume the responsibility for passing natural streamflow and managing releases from the two floodwater retarding structures. sponsibility for passing natural streamflow and managing releases from the multiple-purpose reservoir rests with the City of Newton. Releases, other than natural streamflow, are not to be made when they will interfere with operation of the reservoir for recreational purposes. The recreation pool is normally expected to be operated between elevations 1,486.0 and 1,488.5.

The sediment and beneficial use pools will be checked regularly during the spring and summer months and measures will be taken to control mosquito breeding.

An "establishment period," to allow time for latent defects and design deficiencies to become apparent, shall extend 3 years from the date the structural works of improvement are accepted from the contractor as being completed. The establishment period for vegetative work associated with a structural measure is to terminate when any of the following conditions are met:

- 1. Adequate vegetative cover is obtained.
- 2. Two growing seasons have elapsed after the initial installation of vegetative work.
- 3. The establishment period for the associated structural measure has terminated.

Operation and maintenance responsibility rests with the sponsors during the establishment period, as it does during the remainder of the project life, except that the Service will consider sharing the cost of repairs (on a case-by-case basis) which become necessary as a result of latent defects and design deficiencies. Cost sharing will be at the rate used in project installation.

All structural measures will be inspected annually, after unusually severe floods, and after any other unusual condition that might adversely affect their operation, maintenance, or safety. The Soil Conservation Service and local representatives responsible for operation and maintenance will make inspections for a 3-year period following completion of construction. Thereafter, annual inspections will be made for the life of the structures. Items of inspection will include but not be limited to: the principal spillway and its appurtenances, the emergency spillway, the earth fill, the vegetative cover of the earth fill and emergency spillway, the fences installed as a part of the structural measures, the wildlife mitigation measures, and all recreational facilities. Records of inspections will be maintained by the watershed district and the City of Newton.

Prescribed tree and shrub plantings should be maintained at a 75% survival rate for the first 5 years, and thereafter managed to allow for desirable natural growth and reproduction during the life of the project. Mowing, haying, burning, and livestock grazing will not be permitted unless deemed necessary for wildlife purposes.

Maintenance work will be carried out when needed. Repairs on major construction items, such as dams and spillways, are expected very infrequently. Fences, water and sewer systems, picnic tables, etc., and clearing of trash and debris are expected to be common maintenance items.

Provisions will be made for access to inspect the structural measures at any time.

#### 5. Project Costs

Total project installation cost will be \$2,943,800, of which P. L. 566 funds will cover \$1,090,100 and other sources

will pay the remaining \$1,853,700. Total construction cost will be \$606,700; of this \$507,400 will be paid by P. L. 566 and \$99,300 will be borne by other sources.

#### E. Environmental Setting

#### 1. Physical Resources

Sand Creek Watershed occupies 64,134 acres or 100.2 sq miles in south central Kansas. The upper part of the watershed, 9,186 acres, is in Marion County; the remainder, 54,948 acres, is in Harvey County. There are four municipalities within the watershed: Sedgwick, at the mouth of Sand Creek, and Newton, North Newton, and Walton, all in the central portion of the drainage. Newton is located 26 miles north of Wichita, a major population center of Kansas (see Vicinity Map, p. 20). The watershed has a population of 19,119; of this total, 18,109 persons (95%) live in urban areas, and the remaining 1,010 persons (5%) reside in rural areas.

The watershed is located in the Arkansas River Basin in the Kansas subregion of the Arkansas-White-Red-Water Resources Region.  $\frac{6}{}$  The soil and water resource problems in Sand Creek Watershed are typical of those throughout the region. Uncontrolled or unimpeded runoff contributes to erosion in the uplands and a subsequent concentration of runoff and heavy flooding throughout the flood plain.

Sand Creek Watershed lies entirely within the Central Loess Plains Land of the Central Great Plains Winter Wheat and Range Land Resource Region. 7/ Also, it lies in the extreme eastern part of the Great Bend Prairie physiographic province. The topography ranges from flat to gently sloping, with a total relief of 185 ft from the headlands to the outfall. The land slope equals about 8 ft per mile.

The watershed is underlain by the Wellington Formation, which was deposited during the Cimmeronian Stage of the Permian Period. 8/ This formation is 150 to 200 ft thick in this area



SAND CREEK WATERSHED AND VICINITY

and consists of soft gray and bluish-gray calcareous shale containing several thin beds of shaly limestone and gypsum. The fossil species of plant and animal remains found in this formation are indicative of both marine and fresh-water origins. Although no salt is known to underlie this area, it is present in the subsurface of western Harvey County.

The McPherson Formation overlies the Wellington Formation in the uplands of the western and southern portions of the area. It consists of interbedded silt, clay, and fine sand, and was deposited during the Kansan Stage of the Pleistocene Epoch. It ranges from 0 to 60 ft thick in this area. Recent alluvium in the valley is similar in character to the deposits of the McPherson Formation and no subsurface division can be made between these deposits. The alluvium occurs extensively between Sedgwick and Newton. 9/

Soils of the watershed are varied. 10/Deep, dark, clay and semiclaypan soils of old alluvial origin occupy most of the upland. Moderately deep, friable, silty to clayey soils of loess origin are interspersed in narrow bands on either side of Sand Creek. Flood plain soils are deep, friable, silty to clayey alluvium with streaks of sandy loam deposits. They are mostly Geary, Farnum, Detroit, and Hobbs series, which are deep with moderate to slow permeability and high available water storage capacity (9 to 12 in. in a 60-in. profile). These soils would be suitable for irrigation.

The climate of the area is considered "Humid Continental Warm Summer" by Koppen and "Moist Sub-Humid" by Thorntwaite classification.  $\frac{12}{}$  Normal annual precipitation at Newton is 30.50 in. and has varied from a low of 13.39 in/year to a high of 51.50 in/year. Seventy percent of the rainfall occurs during the summer months as the result of high-intensity thunderstorms. The normal annual temperature at Newton is 56.5°F. The average growing season is 185 days; however, this season has varied from 172 to 203 days during the past 12 years.  $\frac{13}{}$ 

Mineral deposits in Harvey and Marion counties currently yield petroleum and natural gas. However, within the watershed there are presently no known economically recoverable minerals, although sand and gravel have been extracted in the past. Several oil and gas pipelines extend through the area. Land use in the wateshed is as follows:

Land Use	Percent	Acres
Cropland	78	50,025
Grassland	13	8,337
Woodland		300
Other	9	5,472
Total	100	64,134

Land use in the flood plain is similar to that in the watershed as a whole. The percentage of cropland is slightly lower and grassland, woodland, and other uses are somewhat higher. Croplands primarily produce wheat, grain sorghums, soybeans, and alfalfa. Grasslands are primarily used for dairy and beef cattle.

In the vicinity of cities there is a trend toward increased urban expansion, suburban housing developments, and individual nonfarm, rural residences. If economic and population growth continue, this trend will probably also continue.

Woodlands in the watershed consist mostly of elm, ash, cottonwood, hackberry, and osage orange trees. Their commercial quality is low and they commonly serve as pasture for livestock. Woodlands are often erosion problem areas because of heavy livestock use.

Sand Creek with its tributaries is the major surface water resource of the watershed. It originates about 3 miles southeast of the town of Goessel, Kansas, in Marion County and flows south-southwest to its confluence with the Little Arkansas River, a distance of about 24 air miles. The stream system contains about 90 miles of channel, including major tributaries.

During the watershed planning investigations Sand Creek was divided into eight study reaches as shown on the Project Map, p. 190. Reaches 1 through 4, from the mouth of the stream upstream to the south edge of Newton, are considered intermittent. During drought periods the only flow in these reaches comes from the effluent of Newton's sewage treatment plant. Reaches 5 through 8, upstream from the Newton sewage treatment plant, are also considered intermittent because although the stream

continues to flow after each period of surface runoff, it ceases to flow during moderate drought periods. In spite of the lack of natural, permanent base flow, most of the eight reaches of Sand Creek exhibit a well-defined natural channel.

Portions of reaches 4 and 5 through the City of Newton have been modified for flood control by the U.S. Army Corps of Engineers. Three miles of Sand Creek in reaches 4 and 5 have been straightened, shaped, and riprapped. In addition to the channel modification, channel cleanout and snag removal was carried out for 1 mile above and 2 miles below the modified section.  $\frac{14}{}$ 

Ground water is the principal source for farmstead, municipal, and industrial water supplies. A summary of ground water supplies for municipalities in the watershed, reported by the Kansas State Department of Agriculture, Division of Water Resources  $\frac{15,16}{}$  and the Kansas State Department of Health, Division of Environmental Health Services,  $\frac{17}{}$  is given as follows:

Municipality	No. Wells	Depth (ft)	Geological Source	Source Capacity (acre-ft)	Plant Capacity (MGD)
Newton	10	150 <u>a</u> /	Equus Beds	3,600	6.5
Sedgwick	3 49,	57,102	Alluvium	46	1.296
Walton	2	30 <u>a</u> /	Alluvium	23	0.05

a/ Average Depth

Ground water supplies in the watershed are considered adequate for present and future municipal populations and industrial applications until 1990.

Water quality is covered by various parameters such as mineral content, total solids, hardness, etc. Generally speaking, ground water quality in the Sand Creek Watershed meets federal standards for drinking waters.  $\frac{18}{}$  The exceptions are around Sedgwick and in the southern end of the watershed, where some wells have high manganese, iron, and hardness concentrations (see Appendix B, p. 102).

The State of Kansas has adopted water quality criteria  $\frac{19}{}$  (Appendix C, p. 106) which give a Class B designation to Sand Creek under the following interpretation of the standards.

"All watercourses which reach zero natural flow annually are exempted from water use classification and the application of water quality criteria, except: (1) those waters specifically listed in the document table, and (2) those waters that can be reasonably expected to support aquatic wildlife because of pooling during periods of no flow."

"Unlisted tributary watercourses which are perennial or which can be reasonably expected to support aquatic wild-life because of pooling during periods of no flow shall be classified as Class B waters."

The latter designation includes Sand Creek. Specific criteria for water quality of Class B streams (State of Kansas) include the following:

- 1. Fecal coliform content shall not exceed 2,000/100 ml, although it is expected that surface runoff during heavy precipitation will exceed this level.
- 2. Dissolved oxygen content shall be maintained above 5 mg/liter (except for 4 mg/liter for short periods of time within a 24-hr period). Dissolved oxygen concentrations less than the above levels shall not be due to man-made point source waste discharges.
- 3. Temperature of receiving water shall not be raised above 90°F by man-made point discharges. Heat of artificial origin shall not be added to a stream that will raise the stream temperature more than 5°F.
- 4. Point source waste discharges shall not cause the pH of waters of the state to vary below pH 6.5 and above 8.5.
- 5. Point source waste discharges shall not cause the undissociated ammonium hydroxide concentration of waters of the state to exceed 0.15 mg/liter as N.

Data on the water quality of Sand Creek 7 miles downstream from Newton (Appendix D) show that fecal coliform counts made

in April 1970 ranged between < 100 and 1,900/100-ml sample. Data reported for analyses made in September 1973 show fecal coliform populations ranged between 700 and 10,000/100-ml sample. 17/ Fecal streptococcal counts are also indicative of human fecal contamination. During the limited sampling periods (7 days each), the fecal coliform and total coliform counts were consistently higher in 1973 samples (gage height 1 to 2 ft) than in 1970 samples (gage height approximately 19 ft). The difference reflects the sewage dilution factor introduced during the higher streamflow rate. Dissolved oxygen for the same analyses ranged between 4.3 and 7.1 mg/liter. Stream temperatures ranged between 55° and 64°F; pH measurements ranged between 7.9 and 8.5.

Water quality samples for Sand Creek at various locations in and near Newton and Sedgwick  $\frac{20.21}{}$  (Appendix E) show acceptable levels of dissolved oxygen, pH, and temperature for compliance with the State of Kansas, Class B waters.

Based upon these data, the water quality of Sand Creek meets the State of Kansas Class B water quality criteria except for fecal coliform counts. Sewage effluent from Newton probably contributes greatly to the fluctuations on fecal coliform populations in the stream.

The natural runoff from farmsteads throughout the watershed influences the water quality of the streams. The most dominant factors which contribute to poor water quality from agricultural runoff are: (1) sediment from sheet erosion, (2) microorganisms from soil and barnyard accumulations, (3) dissolved and suspended solids, and (4) nutrients (nitrogen, potassium, and phosphorus) from organic and inorganic materials. Sediment yields are reported to be 0.50 - 1.00 acre-ft/sq mile/year. 22/Many of the stream pollutants are carried by soil particles.

Streams normally low in bacterial counts receive high bacterial populations through runoff from agricultural lands even with no influence from municipal, industrial, or feedlot waste sources. Both fecal coliforms and fecal streptococci contribute to the bacteriological load under such conditions. With high populations of microorganisms and increased dissolved and suspended solids as nutrients from farmstead runoff during heavy rainfall, the biochemical oxygen demand (BOD) may increase appreciably from biological oxidation of nutrients and lower the

dissolved oxygen content of the stream. Extreme conditions would produce fish kills and reduce the populations of other aquatic life.

#### 2. Present and Projected Population

Population of the watershed area is 19,119. The cities of Newton and North Newton, centrally located with a combined population of 16,829, are the largest incorporated areas in the watershed. Other communities are Walton, located in the northeast, and Sedgwick, located at the very south end of the watershed. Ninety-five percent of the population reside in urban areas. The watershed population is projected to reach 25,000 by the year 2000, and 31,500 by the year 2020.23/ It is expected that most of the increased population will locate in existing towns; thus, there will be no significant change in land use from rural to urban. Present and projected populations are shown below:

#### POPULATION IN SAND CREEK WATERSHED

		Population	
Area	1972	2000	2020
Watershed	19,119	25,000	31,500
Newton & North Newton	16,829	NA	NA
Walton	214	NA.	NA
Sedgwick	1,066	NA NA	NA
Rural areas	1,010	NA	NA

NA = not available.

#### 3. Economic Resources

Most of the land in the Sand Creek Watershed is privately owned. Of the 64,134 total watershed acres, only 3.5% (2,240 acres) are state and local government controlled land. This land is used for schools, rights-of-way, or parks. The largest contiguous tract of publicly owned land is the 120-acre Newton airport.

Farms in the watershed average 310 acres, which is somewhat smaller than the Harvey County average of 337 acres. Most

of the 196 farms are typical diversified family operations and only five farms employ 1-1/2 or more man-years of labor. About 23% of the agricultural land is owned by the operator; 24% is tenant operated and over half, 53%, is farmed by operators who own one or more units and rent one or more additional farms.

Agricultural operations are based primarily on dry-land crop production, livestock feeding, and dairy operations. There are five dairy herds numbering over 100 head and numerous smaller herds. Nine of the largest dairies in Harvey County milk about 670 animals. There is also some hog production. Appendix F, p. 123, shows livestock, operation data for the watershed.

The major crops produced in the area include wheat, grain sorghums, soybeans, and alfalfa. Wheat and soybeans are the major cash crops with most of the other feed grains and hay marketed through livestock production. In 1971, wheat and cattle productions totaled \$4.5 million and \$5.8 million, respectively.

In a representative flood free year, crop yields per acre in the flood plain are almost double Harvey County average yields, as shown as follows:  $\frac{24}{}$ 

# HARVEY COUNTY AVERAGE YIELDS 1966a/

Crop	Average <u>Yield</u>	Flood Plain Yield
Wheat	28 bu/acre	50 bu/acre
Grain Sorghum	45 bu/acre	90 bu/acre
Silage Sorghum	12 tons/acre	20 tons/acre
Alfalfa	2.3 tons/acre	4.5 tons/acre
Soybeans	17 bu/acre	40 bu/acre
Silage Corn	NA	{ 16 tons/acre dry land 24 tons/acre irrigated

<sup>&</sup>lt;u>a</u>/ Based on 18-year trend line for county yields; flood free yield based on interviews.
NA = Not available.

The natural woodlands contain only small amounts of currently marketable timber; however, several small Christmas tree plantations represent high per-acre value. The greatest woodland value now is soil protection, stream bank stabilization, wildlife habitat, and aesthetics. Trees planted in the urban areas represent a large investment in providing pleasant surroundings.

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Sand Creek Watershed is located in one of the most prosperous farming areas in the state. Economic conditions are represented by Harvey County averages. The average market value of all agricultural products sold in Harvey County (before taxes and expenses) averaged \$17,351 per farm in 1969, which was a 25% increase (\$3,477) since 1964.

In 1969, the median family income for Harvey County residents was \$8,745, slightly above the state median income figure of \$8,693. Only 7.1% of the families had incomes below the poverty level compared to 9.7% for the state.  $\frac{25}{}$ 

Most family farms in the area generate incomes above the poverty level. More than 80% of the farms in Harvey County had sales of farm products totaling over \$2,500 in 1969. Forty-four percent of the farms in the county had sales of farm products over \$10,000. Less than 3% of the farms, operating on a full-time basis, had sales of farm products less than \$2,500. In addition, nearly 17% of the farms which were operating on a part-time or on a retirement basis did have sales less than \$2,500. However, it should be noted that many of these farmers worked more than 100 days off farms to supplement their incomes.  $\frac{26}{}$ 

The current value of land adjacent to urban centers in the watershed is \$1,000 per acre. Current nonurban market land values are roughly \$300 per acre for upland cropland, \$150 per acre for upland pasture, \$300 per acre for tributary bottom land, and \$350 per acre for mainstem bottom land. The gross value of the composite flood plain acre\* is projected to range from \$110 to \$132 in the year 2000.

<sup>\*</sup> Gross value of a composite flood plain acre is defined as the value of production, without flooding, from 1 acre of representative flood plain land use.

Highway, rail, and air transportation all provide access to major grain marketing terminals such as Wichita and Hutchinson. The watershed is served by a system of secondary roads. Major highways to markets in and outside of the watershed are: K-15, I-35, US-81, and US-50. The Atchison, Topeka, and Santa Fe and the Missouri Pacific railroad both provide service to the watershed. In Newton, there are Amtrak and air transportation services.

Unemployment has been increasing in Harvey County but is still below the state level. In 1969, there was 2% unemployment compared to 3.9% for the state. By December 1970, county unemployment had increased to 2.4% and by December 1971, it had risen to  $4\%.\frac{27}{}$  State unemployment rates continued to be greater, going from 4.9% in 1970 to 5.7% in 1971. $\frac{28}{}$ 

Despite the agricultural orientation of the county, manufacturing and trade play an important part in the overall area economy. Out of a total employment force of 11,642, 22% are employed in manufacturing and 20.9% are employed in wholesale and retail trade. The principal manufacturing industry within the watershed is the construction of mobile homes and mobile home components. Thirteen percent of the Harvey County labor force is employed outside the county. 25/

The total value of all land in the watershed is nearly \$22,000,000. About \$5,500,000 of this is attributed to urban areas, and the remaining \$16,500,000 represents the value of rural lands. Thus, the average land value of a farm unit is about \$84,000. The values of improvements and farm equipment would increase this capitalization. It appears that the value of real and personal property in the watershed is substantial and provides an adequate base for generating tax revenues to local and county governments. The tax revenues in the area seem to be adequate to support the maintenance of many rural roads and highways.

Harvey County recorded a 5.3% increase in population during 1960-1970 and the population of Newton increased by 3.8%.

The population of both Harvey County and the watershed area is predominantly urban. Over 56% of the county's 27,236 residents live in urban communities. The presence of a city the size of Newton (population 16,829) accounts for a large portion

of this. The inclusion of the city in the watershed area results in 95% of the area's 19,119 residents being classified as urban. The nonwhite population in Harvey County account for only 2% of the total population.  $\frac{25}{}$ 

Harvey County residents have a median age 2 years older than state residents as a whole--30.6 years compared to 28.7 years. A greater proportion of people in the retirement ages accounts for part of this difference. Nearly 14% of the county population is 65 years or older compared to 11.8% of the state population.  $\frac{29}{}$ 

Median school years completed by county residents age 25 years and over is 12.3 years—the same as the state average. This indicates many residents have gone past the high school level. In 1970, 7,886 persons between the ages of 3 and 34 years were enrolled in school.  $\frac{25}{}$ 

The average farm operator is considerably older than the average county or state resident. The average age of the farm operator is 50.3 years. This compares to a median age for all county residents of 30.6 years—some 20 years greater than the average for county residents and nearly 22 years greater than the average for state residents.  $\frac{26}{}$ 

Marion County is included in the Flint Hills Resource Conservation and Development Project which also includes Chase, Lyon, and Morris Counties.

#### 4. Plant and Animal Resources

Because Sand Creek is intermittent and therefore cannot support stable aquatic populations, fishery potential is marginal at best. The number of species found in this stream would probably be considerably less than that found in adjacent streams of the general area which have perennial flows. Permanent pools in some of the Sand Creek tributaries offer limited fishing, but most of the fishery potential in the watershed is found in farm ponds on private land. There are no known fish inventories of Sand Creek Watershed; however, there are about 24 species of fish which occur in this general area. 30/ Among these are nine species of Centrarchids, which include the largemouth bass, blue

gill, crappie, etc., and two species of catfish which are found in the streams and farm ponds. See Appendix G, p. 125 for a list of fish species likely to occur within the watershed.

There is no known survey of amphibians or reptiles for the watershed. Data from various sources  $\frac{31-35}{}$  (Appendix H, p. 128) report 1 species of salamander, 8 species of frogs and toads, 9 species of lizards, 9 species of turtles, and 23 species of snakes are found in this general vicinity.

In general, it appears that those species adapted to more arid conditions are found in this area. For instance, there are fewer salamander species found in the project area than in eastern Kansas. Snake species, on the other hand, are well represented in the area fauna.

The bird life of the watershed is varied, and a mixture of eastern and western North American birds inhabit this area. Some of these species are permanent residents, others are seasonal, and yet others are transient during their northern or southern migrations. Of the birds species in this general vicinity, 34 would be considered permanent residents, 61 are summer residents, 28 are winter residents, and 116 are transients. Appendix I, p. 131, lists birds of the Sand Creek vicinity. Not all of these species would be necessarily present in the watershed.

There are 47 species of mammals which have a geographical range that includes the Sand Creek Watershed. (See Appendix J, p. 138.) Of these species, there are 12 which would be considered fur-bearers or game animals.

Habitat for upland game is considered marginal to good. In general, however, there is little permanent cover available for many species. About 300 acres, or 0.5% of the project area, is woodland. Lack of permanent cover is a major limiting factor for wildlife populations in this area. 5/

Species of small game wildlife hunted in the watershed include bobwhite quail, mourning dove, ring-necked pheasant, fox squirrel, and cottontail rabbit. In addition, the project area is within the western portion of the Central Flyway for migratory waterfowl, but there is presently little waterfowl

hunting or habitat within the watershed. Deer hunting potential is increasing, and hunting is presently allowed on a permit system.

There are three bird species observed in Kansas which are on the national endangered wildlife list; 38/ these species are the whooping crane (Grus americana), the peregrine falcon (Falco peregrinus), and the bald eagle (Haliaeetus leococephalus). The Kansas Academy of Science 39/ lists these and four additional species as endangered in Kansas; these are the prairie falcon (Falco mexicanus), the burrowing owl (Speotyto cunicularia), the black-capped vireo (Vireo atricapilla), and the Eskimo curlew (Numenius borealis), which is probably extinct.

Birds listed as rare in Kansas but not nationally are the whistling swan (Olor columbianus), the osprey (Pandion haliaetus), the merlin (Falco columbarius), the long-billed curlew (Numenius americanus), and the bobolink (Dolichonyx oryzivorus).

Several of these species are birds of prey and are limited through reduced reproduction caused by insecticide ingestion, not through lack of habitat.  $\frac{40,41}{}$  An exception to this is the whooping crane, whose decline is more related to land use changes and the depredations of man than to the use of insecticides.

The southern lemming-mouse (Synaptomys cooperi), the spotted skunk (Spilogale putorius) and the bobcat (Lynx rufus) are mammals listed by the Kansas Academy of Science as rare in Kansas, but not nationally, and may be present within the watershed.

The botany department at Kansas University lists Oklahoma phlox (Phlox oklahomensis) as rare, uncommon, or at least of limited distribution in North America. This plant may be present within Sand Creek Watershed. Records indicate it has been recorded in an adjoining county (Butler).

Some other plants that may occur within the watershed are listed as rare or at least uncommon within Kansas, although they may occur more abundantly in other parts of North America.

They are: milkweed (Asclepias meadii) and rock elm (Ulmus thomasi).

#### 5. Recreational Resources

In assessing the recreational resources of the watershed, particularly that portion within Harvey County, it is necessary to distinguish between public and private, large and small, and land- or water-based recreation areas. As of 1966, there were 12 public and nine private recreation areas in Harvey County. All of the private recreation areas had 10 or more acres, but only two of the public areas were that large. The total area of all recreation areas in the county was 1,090 acres, of which 25%, or 235 acres, were water acres. Only 40 of these 235 acres were publicly owned. This means that 4% of the total recreation area of the county was available for general public, water-based recreation.  $\frac{42}{}$ 

There are no lakes suitable for water sports in the Sand Creek Watershed. The nearest large impoundments are Cheney Reservoir and Marion Lake. Cheney Reservoir, built by the Bureau of Reclamation, is located about 45 miles southwest of Newton and is heavily used by Wichita and Hutchinson residents. Marion Lake, built by the U.S. Army Corps of Engineers, is approximately 40 miles northeast of Newton. During 1972, about 820,400 persons used the recreational facilities at this lake.  $\frac{43}{}$  Within the city of Newton, a Fabridam (nylon reinforced neoprene dam) has been installed on the Sand Creek channel. The Fabridam is inflated by water pressure during normal flow periods and automatically deflates during periods of high flow. There is some fishing, canoeing, and rowboating on this 26-acre impoundment, but it is primarily for water storage and aesthetic value. Multiplepurpose Structure No. 14 in the recently authorized West Sector Whitewater River Watershed will be located about 6 miles east of Newton. When completed, this 231-acre lake will offer public recreation for 50,000 recreation visits annually.

# 6. Archeological, Historical, and Unique Scenic Resources

A preliminary archeological field reconnaissance was conducted for Sites Nos. 1, 2, and 3 in the summer of 1974. Preparation for the field studies involved a review of literature from previous archeological investigations of sites from nearby areas. These adjacent sites represent cultures of the nomadic Paleo-Indian, ca. 8000-5000 B.C.; the Archaic period, ca. 5000 B.C.-O A.D.; the Middle Woodland period, ca. 0-1000 A.D.; and the Protohistoric period, ca. 1500 A.D.

The proposed construction sites were extensively surveyed on foot during a 3-day period. Conditions were good for surface collecting and surveying. All areas were randomly probed to a depth of at least 2 ft. No surface evidence of habitational sites was observed in the recreational area of Site No. 1 or in the projected structural areas of Sites Nos. 1, 2, or 3. There still remains, of course, the possibility of more deeply buried sites. In addition, at Site No. 3 a small area of pioneer graves was found; the headstones had been removed to expedite farming. According to local residents, this small cemetery is located somewhere in the NE 1/4, SW 1/4, NW 1/4, Sec. 11, T22S, RIE.44/

The complete report of the preliminary archeological reconnaissance is included in Appendix K, p. 141.

The National Register of Historic Places lists the Carnegie Library, Warkentin House, and Warkentin Mill, all located in Newton, and the Bethel College Administration Building on the campus in North Newton, as historical sites.  $\frac{51}{}$  These sites do not lie within any proposed construction area of the project.

There are no widely recognized unique scenic areas within the watershed.

## 7. Soil, Water and Plant Management Status

With the exception of residential development in the vicinity of Newton, the following land use pattern has been essentially constant within the watershed:

Land Use	Percent	Acres
Cropland	78	50,025
Grassland	13	8,337
Woodland		300
Other	9	5,472
Total	100	64,134

Before 1961 only a few scattered farms were applying land treatment measures. Through an extensive educational program by the watershed steering committee, 49% of the watershed was under cooperative agreement with the Harvey and Marion County Conservation Districts by 1965.

Efficient use of capital and labor on easily eroded or marginal uplands has continued to increase, and presently approximately 60% of the watershed farmers are cooperators with the two conservation districts. Plans are being implemented to control erosion and improve cropland, hayland, pastureland, woodland, and wildlife habitat.

At present, about 54% of the land under cooperative agreements is adequately treated. This includes the construction of approximately 36% of the waterways, 28% of the gradient terraces, and 75% of the needed farm ponds. Good conservation cropping systems are in use on 50% of the cropland. However, pasture management is poor, and only 15% of the treatment needed on rangeland has been applied. The practices that have been applied are as follows:

Land Treatment Measure	<u>Unit</u>	Amount Applied as of January 1972
Conservation Cropping System	Acre	25,000
Farm Pond	Number	16
Grade Stabilization Structure	Number	177
Grass Waterway	Acre	525
Range Proper Use	Acre	4,554
Range Seeding	Acre	100
Terraces, Gradient	Mile	217

About 6% of the flood plain cropland is being irrigated using treated effluent from the Newton sewage treatment plant. This water and available flows in Sand Creek comprise the only source for irrigation water in the watershed. Since the flow in Sand Creek is intermittent, the sewage treatment plant effluent is the only dependable source. Furthermore, water in Sand Creek is exceptionally hard, with up to 424 mg/liter total hardness. Surprisingly, the total hardness increases with increased flow because of the greater solution of calcium sulfate deposits along the channel during wet periods. Inadequate water supplies and poor quality water indicate that few additional areas of cropland can be brought under irrigation.

Other agencies with programs affecting land use and treatment in the watershed are the Cooperative Extension Service and the Forest Service. The Extension Service, through county agricultural extension agents, assists with informational and

educational programs to carry out conservation objectives. Through cooperative agreements with the Forest Service and the Kansas State Forester, all of the grassland and woodland acres in the watershed are within rural fire district protection. The Forest Service and the Kansas State Forester have also assisted in installing 900 acres of tree and shrub plantings on woodlands and other lands.

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#### 8. Projects of Other Agencies

The U.S. Army Corps of Engineers has provided flood protection to Newton by modifying Sand Creek through the city. The channel was straightened, shaped to a trapezoidal cross section, and protected from erosion by rock riprap and grass. The channel is now capable of handling 50-year frequency storms. 14/Works of improvement proposed in this plan are complementary to the Corps' channel work.

#### F. Water and Related Land Resource Problems

#### 1. Land and Water Management

Loss of soil through sheet and rill erosion is a major problem on untreated cropland. Soil losses\* of 13 tons/acre/year are not uncommon; average soil loss is 7 tons/acre/year. This results in a reduction in crop yields and farm income. Excessive soil loss results in sediment deposition in road ditches, farm ponds, streams, and on the flood plain.

Resource management systems are needed on 50,025 acres of cropland, 8,337 acres of rangeland, and 300 acres of woodland. Resource management systems include those conservation practices needed to accomplish soil and water conservation objectives for each land use. Cropland management systems include waterway development, terracing, conservation crop rotations, contour farming, and crop residue use. Pastureland management systems include pasture planting and pasture management. Range seeding, proper grazing use, brush management, and planned grazing systems are important components of range management systems.

More emphasis needs to be placed on contour farming. Some farmers have discontinued farming their terraced land on the contour. This trend needs to be reversed. Improved residue

<sup>\*</sup> Soil loss is the gross quantity of material removed from a site of erosion.

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management practices, such as minimum tillage and stubble mulching, are also needed.

Rangeland pastures are relatively small in acreage. The number of livestock in the project area far exceeds the carrying capacity of the rangeland resource. Overgrazing is common. Most of the pastures are accessible to livestock yearlong. Even when cropland is being utilized as the primary source of forage, livestock is given access to rangeland pastures due to permanent sources of livestock water located in these pastures. This results in trampling and repeated overgrazing of the more desirable plants. Gradually the pasture vegetation is reduced in vigor and production declines. As the more desirable plants are weakened, weeds invade and increase in abundance. Runoff becomes excessive, causing erosion and subsequent sedimentation. Lowered rates of moisture infiltration from soil compaction reduces productivity of rangeland vegetation.

Adequate treatment of rangeland is needed to reduce erosion and sediment deposition in reservoirs and stream channels. Sediment surveys have indicated that well-managed rangeland with conditions similar to those in the project area yielded only 0.4 tons sediment per acre annually, whereas poorly managed rangeland produced 1.6 to 2.0 tons/acre/year.\*

Many pastures have rows of osage orange trees as borders. These trees have invaded the pastures and compete with forage plants for light and moisture. Mechanical and chemical brush control methods will be used to control invading brush and trees.

The watershed contains 300 acres of woodland, mostly adjacent to Sand Creek and its major tributaries. These stands are generally of poor commercial quality. There is frequent overgrazing of woodland areas resulting in increased soil loss. There is also a need for tree plantings for windbreaks, shelterbelts, wildlife, and recreation uses.

Many of the farms in the headwater region have not established soil conservation practices. This area of the watershed is divided into small, separately owned tracts. It will take considerable time and very careful handling to secure the application of needed conservation practices in this critical region.

<sup>\*</sup> Sediment yield is the net quantity of material delivered to a point of measurement from a site of erosion.

Twenty-three percent of the farms are operated by full owners, 53% by part owners, and 24% are rented. Farms operated by part owners must produce income for both the tenant and the owner, and therefore these owners have fewer financial resources to install needed land treatment measures. Many landowners, however, can take advantage of assistance offered by federal cost sharing programs.

### 2. Floodwater Damage

Floodwater damage has been extensive on rural and agricultural lands. The major damage occurs to growing crops. Most flooding occurs during the growing season, but floods occur throughout the year. Flooding which comes before or shortly after fields have been planted causes extra tillage and reseeding operations. Other agricultural facilities damaged are fences, machinery, and farm buildings. Floodwater damage also occurs in North Newton, Newton, and Sedgwick; property destruction and even loss of life have been direct or indirect consequences of floods in urban areas.

Approximately 7% or 4,619 acres of the land in the watershed is subject to flooding. The flood plain includes 4,353 acres of rural land and 266 acres of nonrural land in Newton, North Newton, and Sedgwick. Agricultural flood plain land includes 3,403 acres of cropland, with values up to \$350 per acre. There are 47 farming operations affected by flood damages.

Land use of the flood hazard area on the evaluated reaches of the flood plain is as follows:

Land Use	Acres	Percent
Cropland	3,403	73
Rangeland	688	15
Woodland	88	2
Other	<u>440</u>	_10
Total	4,619	100

Average annual flood damages by reaches (see Project Map, p. 190) are as shown on the following table:

		Damage
	Flood Plain	Estimation
Reach No.	(acres)	<u>(dollars)</u>
1	620	8,300
2	1,285	26,200
3	861	35,200
4	380	10,900
5	145	100
6	292	4,400
- <b>7</b>	477	10,200
8	392	11,300
Tributaries	167	<u>a</u> /
Total	4,619	106,600

a/ Included in reaches above

Since 1900, there have been 12 major floods in Sand Creek Watershed. Until the relatively recent flood of June 9, 1965, the most severe flood occurred in 1923. The 1965 flood crested 2 ft higher than any of previous record. 14/ The flood of 1923 had an estimated discharge of 10,000 cfs with a frequency of once in 29 years. The flood of 1965 had an estimated discharge of 20,000 cfs, and a frequency of once in about 350 years.

The 1965 flood damaged or destroyed 360 houses, 30 commercial establishments, urban parks, water and sewer lines, streets and bridges, and private utilities in the urban area of Newton. Two lives were lost as a direct or indirect consequence of the flood. The total damage to Newton was estimated to be \$1,201,000.

Damages to the city of Sedgwick from the 1965 flood were estimated to be \$113,500. Of this total, \$12,000 damage was suffered by the Southwestern Bell Telephone Company alone. The town of Sedgwick was damaged by floodwater from the local drainage area located immediately northeast of town in addition to the flooding caused by Sand Creek mainstem.

In addition to urban areas, the 1965 flood was devastating to rural areas. For example, six farms sustained losses totaling \$86,556. Although the total rural loss was not estimated, it was extremely high.

In addition to the other losses, damage to roads and bridges was estimated to have been \$53,000. Further, the damage to the railroad south of Newton was \$19,445.

In 1967 the U.S. Army Corps of Engineers installed a local protection project in Newton and North Newton. The project consisted of channel modification through Newton and channel cleanout and snag removal, both above and below Newton. That vicinity is now protected up to a 50-year flood frequency level. Even so, a flood of the severity of that of 1965 would still cause considerable damage.

It is estimated that the average annual damage to crops and pasture due to flooding is \$37,300 and accounts for 35% of the total average annual flood damage. Other agricultural expenses, such as debris removal after flooding, average \$10,300 annually. The total average annual floodwater damage on agricultural lands is evaluated at \$47,600.

Floodwater damage to roads and bridges averages \$26,800 annually. Flood flows wash away road surfacing, scour road shoulders, silt in roadside ditches, and damage bridges. County and township road budgets are not usually sufficient to make immediate replacements and repairs following floods. Repair work to these facilities is spread over a number of years which necessitates extended use of subnormal improvements. An estimated 15.6 miles of road and 31 bridges are subject to flood damage within the project area.

Railroad transportation services suffer during Sand Creek floods. The average annual damage on an estimated 5-1/2 mile stretch of Atchison, Topeka, and Santa Fe track located in the flood plain south of Newton is \$900.

The average annual flood damage in Newton and Sedgwick (attributable to Sand Creek) is estimated to be \$100 and \$2,100, respectively.

Flooding affects everyone in the area due to damage to roads, bridges, transportation, utilities, and loss of business to those serving the agricultural community. Such indirect losses under future conditions without the project are estimated to average \$11,100 annually.

In summary, the total average annual direct monetary floodwater damages are estimated to be \$77,500. There are also significant nonmonetary damages to wildlife species residing within the flood plain area. Seventy-five percent of the storms causing out-of-bank flows occur between April and August. Ground-nesting species of birds are susceptible to flooding during this period. Flooding destroys protective habitat, nests, and young birds. Terrestrial species residing in the flood plain may be displaced or destroyed by floods. Displacement may result in increased predation.

#### 3. Erosion Damage

The average annual upland soil loss for the watershed is 7 tons/acre. On approximately 23,000 acres of untreated cropland, however, the average annual soil loss is 13 tons/acre and may range as high as 20 tons/acre.

In most instances of moderate to light flooding, little scour damage is done to the deep productive flood plain soils because water velocities are low. In severe floods, such as that of 1965, extensive damage occurs. At that time, fields without vegetative cover along the flood plain had soil removed to plow depth or deeper. Scour channels exist on 587 acres, where productive capacity has been reduced by 15 to 29%.

Average annual scour damage to the flood plain is estimated to be \$18,000. Continual high soil losses ultimately diminish agricultural yields and result in the irretrievable loss of a natural resource.

#### 4. Sediment Damage

Sediment, resulting from erosion, is deposited in farm ponds, stream channels, roadside ditches, along field borders, and on the flood plain. The average annual sediment yield for this region is estimated to be 1 acre-ft/sq mile/year. The average sediment yield at the mouth of Sand Creek is 22 acre-ft/year. An additional 78 acre-ft/year are deposited annually throughout the watershed.

While the monetary damages of sediment deposition have not been fully evaluated, some of the physical effects are obvious. Farm ponds are disrupted as sedimentation following runoff 42

affects turbidity, dissolved oxygen, and temperature of the water as well as the spawning beds in the ponds. Following heavy runoff, stream channels are often plastered with mud which smothers vegetation and is aesthetically unpleasing. Sedimentation on flood plains alters soil structure, nutrient content, and water regimes. It causes deterioration of grain crops by stimulating sprouting and fungus growth; it also increases the cost of cleaning and separating the grain, and contributes to harvesting equipment attrition (included in crop and pasture damage evaluation). Sediment deposits are subject to wind action and can add to dust storms. Finally, sedimentation of natural field drains inhibits surface water runoff from cultivated areas.

#### 5. Municipal and Industrial Water Problems

Ground water supplies in the watershed are considered adequate for municipal populations and industrial applications until 1990. Beyond that year additional sources must be found.

#### 6. Recreation Problems

Water-based public recreational facilities in the watershed are extremely limited, as there are no lakes or streams suitable for water sports. The City of Newton has installed a Fabridam on Sand Creek within the city, but recreational use of the pool is limited to some canoeing, fishing, and aesthetic enjoyment.

Recreational facilities described in the section entitled "Recreational Resources" do not fully meet the demand for such resources. It is estimated that by 1980 demand will exceed supply for several recreational activities in Harvey County. Specifically, the need will exist for an additional 139,938 annual activity days of boating and 51,222 annual activity days of camping. By 2020, annual demand for picnicking and fishing, as well as boating and camping, will exceed supply. Demands for boating, camping, picnicking, and fishing in 2020 are estimated to exceed supply by 467,264; 239,848; 111,328 and 93,696 annual activity days, respectively. 42/\*

<sup>\*</sup> Demand and supply projections of this study may be affected by the increased travel costs since 1966.

The area consisting of Harvey County and any point within 20 miles of the county is defined as the "local area of influence," or the land area for which day-use recreation in the watershed is considered important. This local area of influence has a present population of 66,000 and a projected population for 1980 of 96,000 persons. In addition, the urban areas of Wichita and Hutchinson, with a present combined population of 443,000, are close to this region. Their projected combined population of 510,000 in 1980 may signal additional pressure on recreational facilities which watershed residents use or are intending to use in the future.

The results of a population sample of Harvey County for recreation preferences showed that 38% chose sports (either spectator or participant), 29% chose picnicking, and 14% chose warm-water fishing as their first choice.  $\frac{42}{}$  Because the acreage for water-based recreation areas in the county is extremely limited, and since sports, picnicking, and fishing are high priorities among county residents, there is a definite interest in recreation facilities that provide a combination of these activities.

#### 7. Plant and Animal Problems

In general, the diversity of wildlife in this area is decreasing. The U.S. Fish and Wildlife Service in concurrence with the Kansas Forestry, Fish and Game Commission stated:

"Generally, clean farming practices of the project area have left little wildlife cover.---Woodlands in these areas total 300 acres and include cottonwood, honey locust, red cedar, willow, American elm, ash, Russian olive, mulberry and osage orange. These trees, together with their understory of shrubs, forbs and grasses, lying adjacent to cropland, provide habitat needs for wildlife. Lack of vegetative cover of this type is a major limiting factor for game populations in this area. Loss of a few acres of cover reduces game populations over a greater acreage of surrounding lands."5/

It is evident that there is a need for the development of wildlife habitat, particularly cover, throughout the watershed. It must further be recognized that a substantial increase in cover would be in competition with agricultural production, at least in the short run. However, the possibility exists of encouraging landowners to enhance wildlife cover around the

edges of fields; to practice proper grazing use; and to convert areas of high erosion hazard presently in agricultural production to vegetation suitable for wildlife cover.

Since there are no public lands within the drainage which may be utilized for hunting, this activity is restricted to private lands.

The fisheries potential of Sand Creek is low due to the intermittent nature of this stream. Under present conditions, maintenance of stream flow and fishery habitat is not feasible. The major fishery of the watershed is in small farm pond impoundments; a limited amount occurs in Sand Creek and its major tributaries. Except for the Fabridam impoundment in the City of Newton, access to these areas is privately controlled. The quality of aquatic habitat is further diminished by sediment and low flows in dry years. Below the Newton sewage treatment plant, streamflow at times is entirely treatment plant effluent. The need exists for a stable fishery habitat available to the public.

#### 8. Water Quality Problems

The quality of ground water for municipalities in some areas of the watershed does not meet recommended federal standards for drinking water. The Report of the National Advisory Committee on Water Quality Criteria  $\frac{18}{}$  gives the following pertinent standards for both domestic and municipal supplies:

Constituent	Maximum Recommended Concentration (mg/liter)
Iron (Fe)	0.30
Manganese (Mn)	0.05
Sulfate (SO <sub>4</sub> )	250.00
Chloride (Cl)	250.00
Fluoride (F)	1.00 <u>a</u> /
Dissolved Solids	500.00

 $<sup>\</sup>underline{a}$ / Varies with temperature (0.8 to 1.7).

The wells for municipal water supply at Sedgwick show manganese contents of 0.36, 0.23, and 0.91 mg/liter when the maximum recommended level is 0.05 mg/liter. Iron for those wells is reported to be 2.0, 0.15, and 0.79 mg/liter with a recommended maximum iron concentration of 0.30 mg/liter. Hardness for those wells at Sedgwick is reported to be 406, 448, and 378 mg/liter where 300-500 mg/liter is considered excessive for public water supply. 18/2 Some wells in the southern end of the watershed show amounts of iron and manganese in excess of recommended standards and two of the wells in townships 23 and 24 South, range 1 East are reported to have hardness of 2,000 and 700 mg/liter, respectively. Such hard water is unsuitable for human consumption.

The City of Newton owns and operates a sewage treatment plant with primary settling, digester, and trickling filter systems. This plant has the capacity to handle the waste from an average community of 20,000. Its present loading is from about 16,400 persons. The effluent BOD5 is generally 10 mg/liter, and the effluent discharge is 1.64 mgd. Several industries are connected to this system. Projections of population growth indicate that the facilities will soon be inadequate. Because the effluent during drought periods is the only flow in the stream below Newton, it is important for the plant to be enlarged and efficiently maintained and operated in anticipation of the population growth. The Kansas Department of Health, Division of Environmental Health Services, notified the City of Newton that action to enlarge the plant was needed. Plans and specifications developed and a construction grant application was filed with the U.S. Environmental Protection Agency. The grant was approved by EPA and the plans and specifications are currently being reviewed by the Division of Environmental Services.

#### 9. Economic and Social Problems

In 1969, the county median family income was \$8,745, slightly above the state median income level of  $\$8,693.\frac{25}{}$  Among farm operators that year, 20% produced annual gross sales of farm products under \$2,500. Most of these low-income farms were operated on a part-time or retirement basis; however, many were

farms whose operators worked more than 100 days off their farms to supplement farm incomes.  $\frac{26}{}$  Flood damage to growing crops and personal property is relatively more costly to low-income farmers.

Flood plain farmers are presently not realizing the full economic potential of their lands. While their lands are nearly 100% more productive than upland farms, their land value is only 17% higher. The threat of flood damages depresses land values, yields lower tax revenue to the area economy, and reduces appreciation to the landowner when he sells his land.

Unemployment in Harvey County is below the 1971 state level. However, there is a trend of increasing unemployment in Kansas. As population and unemployment rates in Harvey County rise, there is a steady increase in the number of unemployed persons in the watershed. Present farming operations do not provide significant employment opportunities, as only five of the 196 farming units employed 1-1/2 or more man-years of labor in 1969. The need for additional employment opportunities will probably increase in the future.

While the general economy of Harvey County and the watershed is slightly above the state average, the rural community does not exhibit the same degree of economic welfare. There is a need to increase production on low-income farms and increase land value of flood plain farms. By stimulating rural community development, the economy and the tax base of the watershed will also benefit.

#### IV. RELATIONSHIP TO LAND USE PLANS, POLICIES, AND CONTROLS

Sand Creek Watershed lies in the Kansas subregion of the Arkansas-White-Red Water Resource Region designated by the Water Resources Council. 6/ "The Arkansas River Basin in Kansas" 45/ report shows 81 feasible P. L. 566 projects, including Sand Creek Watershed. The total area for these projects is 15,674 sq miles, or 37% of the Kansas portion of the Arkansas River Basin. Applications for P. L. 566 assistance have been received for 51 of these projects, which would cover 10,820 sq miles. Eleven projects have been completed; 14 are authorized for construction; and 11 (including this project) are authorized for planning.

Installation of the works of improvement on all 81 feasible watershed projects would benefit 668,000 acres of flood plain land. In the proposed reservoirs, the combined storage capacities would be 224,900 acre-ft for sediment, 1,070,500 acre-ft for floodwater detention, and 65,300 acre-ft for multiple use.

At present, land use in the Kansas portion of the Arkansas River Basin is 57% cropland, 35% rangeland, 2% woodland, and 6% other uses. Cumulative effects from the 81 feasible watershed projects would convert a total of 32,600 acres to water storage, and thus increase the amount of land in the category of "other use" by 0.1%.

A comprehensive plan for Harvey County is in the development stage. The land use element considers works of improvement included in the general plan of Sand Creek Watershed Joint District No. 68. This assures compatability between the work plan and comprehensive plan. It is also a first step to avoid conflicts between future development and the reservoir sites. Harvey County Commissioners have expressed the intent to include flood plain regulations in future zoning ordinances.

There are no other proposed federal, state, or local land use plans related to the Sand Creek Watershed.

#### V. ENVIRONMENTAL IMPACT

#### A. Conservation Land Treatment

The land treatment program will result in more efficient use of land and water resources. Adequate management and protection on an additional 22,970 acres of cropland, 3,720 acres of rangeland, and 300 acres of woodland will be provided. Conservation land treatment will reduce erosion, improve soil tilth, upgrade water quality, increase moisture intake by soils, and increase crop and livestock production.

The application of planned land treatment will reduce the average annual soil loss from 8.3 to 2.3 tons/acre on cropland and from 3 to 2 tons/acre on rangeland. The overall reduction in soil loss in the watershed is expected to be 69%, resulting in more productive upland soils.

Presently, 22 acre-ft of sediment enter the Little Arkansas River annually from Sand Creek. With the completion of the floodwater retarding structures, the detention dams, and adequate treatment of 75% of the cropland, annual sediment yield from Sand Creek will be about 10 acre-ft/year, a reduction of 55%.

Resource management systems on croplands, rangelands, and woodlands will not only contribute to protection of the watershed, but will increase forage production for livestock and food and cover for many wildlife species. Land use conversions will result in the loss of 1,422 acres of cropland and 245 acres of rangeland, and the addition of 950 acres of hayland, 80 acres of pastureland, 317 acres of wildlife and recreation land, 10 acres of woodland, and 310 acres of other land use.

Detention dams, as part of the land treatment measures, will reduce flood damage on the tributary streams and add 20% to the overall average annual flood damage reduction. Construction of the 19 detention dams will result in a loss of 228 acres of agricultural and terrestrial wildlife habitat land. Periodic flooding will reduce these uses on an additional 831 acres. The addition of 228 acres of surface water will increase the amount of warm-water fish habitat; access will be controlled by landowners, however. These impoundments will also provide some resting sites and food for migratory waterfowl.

With time, land treatment measures should increase habitat diversity and improve woodlands, thus leading to increased populations of game birds such as quail and pheasant.

#### B. Nonstructural Measures

Requirements of Public Laws 90-448 and 93-234 will prevent unwise development of flood-prone areas in Sedgwick and within the 3-mile extraterratorial limit of Newton. Both of these communities will find it necessary to apply for flood insurance and to adopt programs of flood plain management under these laws.

#### C. Structural Measures

Installation of the multiple-purpose reservoir and the two floodwater retarding structures, in conjunction with the land treatment measures, will reduce flooding on 4,619 acres of land in the watershed. Flood protection in Newton and North Newton will be raised to the 100-year flood frequency level. There will be a 59% reduction in average annual flood damages for the watershed as a whole; 10% of this reduction is attributable to land treatment other than the detention dams, 20% to detention dams, and 29% to structural measures. Area benefited in each reach along with percent damage reductions are shown in the following table:

Evaluation Reach	Area Benefited <sup><u>a</u>/ (acres)</sup>	Average Annual Damage Reduction (%)		
1	620	67		
2	1,285	50		
3	861	48		
4	380	54		
5	145	100		
6	292	70		
7	477	71		
8	392	98		
TRIB	<u>167</u>	<del></del>		
Total	4,619	59		

a/ In addition, off-project benefits will accrue to 1,630 acres of flood plain shared in common with the Little Arkansas River.

With the planned project, 33 sq miles or 62% of the drainage area above Newton will be controlled. The three structures will control runoff from 18.9 sq miles or 19% of the total watershed. The watershed protection and flood prevention program will benefit all or parts of 47 farms located on the flood plain. In addition, the project will benefit, directly or indirectly, all of the inhabitants of the watershed.

The following table shows the bank full capacity for each reach in which peak discharges (in csm, or  ${\rm ft}^3/{\rm sec/sq}$  mile) were developed, and for selected frequencies without project conditions and with the planned project (excluding detention dams).

			Pea	k Dis	charg	e Fr	equen	су (у	ears)		
Evaluation	Bank	100	50	10	2	1	100	50	10	2	1
Reacha/	<u>Full</u>	1	Witho	ut Pr	oject		W	ith P	rojec	t	
	(csm)			(csm)				(	csm)		
1	86	216	184	112	49	***	178	154	94	41	26
2	44.5	220	190	118	54	<b>3</b> 2	187	160	97	43	27
3	34	245	215	133	60	36	193	167	103	46	29
4	34	290	250	157	<b>7</b> 5	44	219	187	116	54	34
5	240	312	2 <b>7</b> 0				229	195	121		
6	148	340	293	180	86	51	240	204	124	56	
7	47	381	327	200	92	54	254	217	132	5 <b>7</b>	35
8	56	454	397	2 52	120	71	133	112	70	40	

a/ See Project Map, p. 190 for reach details.

The May 1960 flood without the project but with the Corps of Engineers' channel improvement project would have produced the following damages:

Crop and Pasture	\$64,900
Other Agricultural	12,952
Road and Bridge	29,209
Flood Plain Scour	21,800
Urban	380
Indirect	14,345
Total	\$143,586

With the land treatment (including detention dams) and P. L. 566 structures in place the damages would be reduced to:

Crop and Pasture	\$19,900
Other Agricultural	1,601
Road and Bridge	13,270
Flood Plain Scour	2,600
Urban	
Indirect	3,737
Total	\$41,108

This amounts to 71% damage reduction for this particular flood. The total area flooded would have been reduced from 2,235 acres to 856 acres, a reduction of 62%.

With reduced flood frequency and severity, farmers may use more fertilizer and improved varieties of crop plants and establish soil building rotations. They will also be able to plan and perform tillage, planting, and harvesting operations on a timely basis for improved crop yield. Annual crop and pasture damage will be reduced by 62%. This level of protection is not, however, sufficient for economical conversion of permanent cover to cropland.

The removal of soil through flood plain scour will be substantially reduced, making it possible to regain normal productivity on previously damaged lands. Average annual flood plain scour damage will be reduced by 31%. Annual sediment delivery to the Little Arkansas River will be reduced from 22 acre-ft to 10 acre-ft.

Average annual nonagricultural damages will be reduced by 61%; the average annual reduction of road and bridge damage on the flood plain as a result of this project is estimated to be 57%. Funds previously allocated to repairing flood-damaged structures may be used for improving and modernizing local road systems.

The project will increase the level of protection for the cities of Newton and North Newton to the 100-year flood frequency level. Floods of greater magnitude, however, such as the one of 1965, are quite possible. Therefore, Newton residents are warned against developing a feeling of false security and engaging

in future flood plain development. Flooding in Sedgwick will be reduced to a frequency equal to or less than that occurring due to overflows of the Little Arkansas River. Residents should be warned against assuming a degree of flood protection that does not exist.

Land use and cropping patterns of the flood plain are not expected to change greatly, as indicated on the following table:

#### LAND USE AND CROPPING PATTERN OF THE FLOOD PLAIN

	Without Project(%)	With Project and More
Wheat	33	31
Grain Sorghum	18	17
Sorghum Silage	3	3
Corn Silage	3	3
Corn Silage-Irrigated	4	5
Alfalfa	6	8
Soybeans	6	6
Rangeland	15	15
Woodland	2	2
Other	10	10
Total	100	100

Installation of the structural measures will directly affect 1,456 acres, as shown on the following page:

Wildlife

			and		
·	Cropland Rangela		Recreation	Woodland	Other
	(+) (-)	(+) (-)	(+) (-)	<u>(+)</u> <u>(-)</u>	<u>(+)</u> <u>(-)</u>
Sediment and Recreation Pools Detention Pools Dams and Spillways Recreation	77 <u>a</u> / 344 113 <u>296</u>	159 <u>a</u> / 193 12 200	250 252 <u>b</u> / 127 <u>c</u> / 507 <u>d</u> /	8 <u>a</u> / 21 1 	6 <u>a</u> / 14 1 <u>4</u>
Total	830	564 1	,136	37	25

a/ Converted to water.

The 250 acres to be flooded by sediment and recreation storage pools will be permanently lost to agricultural use and terrestrial wildlife habitat. Of this total, 50 acres are good wildlife habitat, 90 acres are fair, and 110 acres are marginal. Periodic flooding on the 572 acres of retarding areas will interrupt and reduce agricultural and wildlife uses. In addition, construction of dams and spillways on 127 acres will largely displace these uses; however, revegetation will return some land to wildlife habitat. Most of the above land conversion will result from installation of Site No. 1; the entire 1,195 acres to be purchased for public access, recreation, and wildlife management at this site will be essentially lost to private agricultural production. A total of 30 acres of woodland will be either cleared, reduced, or affected by periodic flooding. This is 10% of the total woodlands (300 acres) in the watershed. Inundation will occur on 6.5 miles of intermittent stream channel.

With or without the project, Sand Creek will not support a highly productive stream fishery. The most productive waters in the watershed will continue to be farm ponds. The construction of the three reservoirs will increase warm-water fish habitat in the watershed considerably. It is anticipated that fishing will

b/ Includes 3 acres new tree plantings and 167 acres grasses and legumes.

c/ Planted to grasses and legumes beneficial to wildlife.

d/ Includes 21 acres new tree plantings and 107 acres grasses and legumes.

e/ The floodwater retarding structure detention pools will have 320 acres which remain in the indicated land uses except for periodic interruptions due to temporary floodwater storage.

occur in the three impoundments, even though only the multiplepurpose structure will have public access. The three reservoirs will have a total surface area of about 250 acres.

The reservoir impoundments (and the 19 detention dams) will increase the available habitat for some of the amphibians, primarily frogs. Frogs such as the bullfrog, western chorus frog, and the cricket frog should become more numerous. Other amphibian species, such as the toads and the tiger salamander, will probably remain at present population levels.

Among reptilian fauna, it may be expected that turtle populations will increase due to the increase in water area. Impoundments will reduce the habitat available to lizard and snakes; however, land treatment measures may compensate for this by adding habitat diversity.

The 250 acres of surface water will increase available resting area for migratory waterfowl, particularly ducks. To a lesser degree, they will increase available waterfowl food. Initially, there will be a loss of nesting habitat for some species of song birds due to the clearing of woodlands and brush for the reservoirs. In time, land treatment measures and wildlife habitat enhancement measures should lead to increased song bird populations.

There are several species of birds in this area which are considered rare, or endangered (see Appendix I, p. 131). These species are primarily raptoral or piscivoral and their endangered status is a result of insecticide concentrations rather than either changes in land use patterns or loss of habitat. The proposed project should have no adverse impact on any of the endangered bird species.

Mammalian species which are semiaquatic, such as the muskrat, will probably increase in numbers. The only mammalian species on the endangered list for this area is the black-footed ferret, which may no longer be found in Kansas.

A reduction in mortality to species which inhabit the flood plain below the flood control structures will occur due to reduced flooding. Rather than increasing population levels, this will probably tend to stabilize populations in that area. Measures to enhance fish and wildlife habitat (fencing and seeding areas to grasses and legumes and additional tree and shrub plantings) will increase available food and cover for wildlife. Providing unharvested grain, reestablishing grass pastures, and constructing brush piles will improve the quantity and quality of wildlife habitat near the structure sites. Plantings in areas to be submerged by sediment pools will help reduce turbidity and thereby improve fish habitat.

The construction of the multiple-purpose reservoir will increase opportunities for water-based recreation. This development will convert 1,195 acres to recreational use and is expected to draw visitors from throughout the area of influence. While the lake and recreational facilities will be used throughout the year, it is estimated that 71% of the recreation visits will occur between May 15 and September 15. The daily design capacity will be 300 for sightseeing, 380 for boating and fishing, 120 for picnicking, 100 for swimming, and 100 for camping. The remaining 29% of the total recreation visits will occur between September 15 and May 15. Hunting, fishing, picnicking, camping, sightseeing, and other recreational activities will be available. An estimated 60,000 annual recreation visits are expected. For evaluation purposes, value assigned per recreation visit was \$1.50.

The project will provide facilities and a fishery management program for a minimum of 15,000 annual fishing days for the public on the 195-acre multiple-purpose reservoir. There will also be 55 acres of warm-water fishing created on private lands.

Traffic, litter, and noise around the recreation facilities will increase. For nearby residents, the aesthetic value of the area may decrease with the addition of the reservoir and the public recreation facilities. Fifty acres will be exposed around the full pool shoreline 20% of the time.

Water quality in the multiple-purpose reservoir is expected to be adequate for intended use and to meet Class A water quality standards except during periods of runoff.  $\frac{50}{}$ 

Sediment pools of the impoundments will be of some benefit to agricultural operations by providing livestock water supply, an increase in ground water recharge through percolation (but no change in ground water quality), and some stabilization of stream flow in Sand Creek.

The reservoirs are expected to have minor effect on low flows in Sand Creek. Natural streamflow will be passed through the dams during drought periods as required to meet downstream water rights. Some seepage from the reservoirs is expected to contribute to streamflow. Reductions from or additions to low flows are not expected to be of sufficient magnitude or duration to change the intermittent classification of Sand Creek. The reservoirs are not expected to have an appreciable effect on water quality in Sand Creek other than reduction in sediment concentrations.

Vector control problems are expected to be minimal. Sediment and beneficial use pools will be checked regularly during spring and summer months and measures taken to control mosquito breeding.

Some soil erosion and air and water pollution will occur during reservoir construction. These will be minimized as much as possible under the guidelines of SCS Engineering Memorandum 66.

No farm dwellings will be inundated but an estimated 15 persons on five farm operations will be eligible for relocation assistance due to acquisition of 775 acres of privately owned land.

Value of flood plain land may rise with increased flood protection, thereby increasing tax revenues of local and county governments and profits to landowners upon the sale of these lands.

Archeological sites that may be discovered in the proposed reservoirs will be reported promptly to the Archeological Division of the Kansas State Historical Society and to the National Park Service. The Service will request comments from the Advisory Council on Historic Preservation if such properties are determined to be eligible for inclusion in the National Register of Historic Places. Potential destruction of archeological material could occur initially by earthmoving activities or later by wave or wind action after pools have been filled. All efforts will be made to avert such loss.

A false sense of security and future flood plain development may result from increased levels of flood protection unless flood plain management regulations are adopted. More intensive use of these lands, particularly in Newton and Sedgwick, would increase potential damages from floods.

#### D. Economic and Social

Construction of the P. L. 566 structures will provide 19 man-years of new employment. Operation and maintenance of the structures and the recreation facilities will provide 1.2 man-years of employment annually. These employment opportunities will primarily come to low and moderate income groups of the area.

Increased flood protection will accrue to all or parts of 47 farm units in the watershed. As property damages from flooding are reduced, these residents will have reduced flood-related expenses. In addition, reduced flooding will improve the transportation system used by all watershed residents.

It is estimated that 775 acres of five farms will be inundated or otherwise affected by structural measures. None of the actual dwellings will be inundated or affected. Owners of these farms will be paid fair market value for the lands they lose. They must choose either to relocate, with assistance provided, or continue on their farms with their reduced land acreages. It is expected that since many of these residents are near retirement age they may decide to continue their operations with a reduced land acreage. Decreasing the sizes of the farms will result in a decrease in agricultural income for farm operators. However, money paid to owners for the land can be invested to earn income to offset the farm income loss.

Rural development would be affected by the increased agricultural production, income, and stability resulting from decreased flooding.

· Secondary effects from the project will include transporting, processing, and marketing greater amounts of agricultural commodities produced as a result of reduced crop losses. Increased farm incomes may be expected to produce increased consumer expenditures for farm equipment and material, and therefore a growth in net returns for local retailers and wholesalers. Increased job opportunities and commercial growth will occur, particularly in the recreational area.

There are also substantial intangible effects which will accrue from the structural measures. Many flood plain residents

will have improved living conditions and economic and psychological security from reduced flooding. Individuals eligible for relocation may experience considerable indecision, anxiety, or disappointment over their available options.

The recreation development will provide open space for public use as well as providing recreation and fish and wildlife uses.

Comparing average annual project structural benefits (\$160,900) to total average annual project structural costs including project administration (\$126,700) gives a benefit-cost ratio of 1.3:1. (See Appendix N, p. 158, for a comparison of benefits and costs of structural measures.)

#### E. Favorable Environmental Effects

Adequate management and protection on an additional 22,970 acres of cropland, 3,720 acres of rangeland, and 300 acres of woodland will be provided.

Average soil loss will be reduced from 8.3 tons/acre/year to 2.3 tons/acre/year on cropland and from 3 tons/acre/year to 2 tons/acre/year on rangeland. An overall 62% decrease in soil loss is expected in the watershed. Land treatment will reduce water pollution by reducing the movement of soil particles which often transport pollutants.

There will be less sediment deposition in road ditches and farm ponds; the average annual sediment yield to the Little Arkansas River will be reduced from 22 acre-ft to 10 acre-ft.

The detention dams, floodwater retarding structures, and the multiple-purpose reservoir will increase landscape diversity, improve fish habitat, and provide additional feeding and resting sites for waterfowl.

Average annual flood damages will be reduced by 59% on 4,619 acres of flood plain land. Flood protection in Newton will be raised to the 100-year flood frequency level. All or parts of 47 farms will have reduced flood damages. Average annual crop and pasture damages will be reduced by 62%. Average annual flood plain scour will be reduced by 31%.

Average annual nonagricultural damages will be reduced by 61%; road and bridge damages will be reduced by 57%.

The multiple-purpose reservoir will provide 195 acres for public warm-water fishing and water-based recreation. There will be 283 acres of warm-water fishing created on private lands. A total of 1,195 acres for public recreation and open space will be provided. There will be 50,000 additional visitor days of recreation provided, including 15,000 annual fishing days for the public.

The 478 acres of surface water created will increase available resting areas for migratory waterfowl; waterfowl food will also be increased to a lesser degree. Some species of amphibians and reptiles may also increase in numbers.

Wildlife habitat will be improved by planting grasses, legumes, trees, and shrubs; providing unharvested grain; allowing native grass pastures to become fully reestablished; and constructing brush piles.

Sediment pools will provide some livestock water supply and flow stabilization for Sand Creek.

Values of flood plain land may rise with increased flood protection, thereby raising tax revenues of local and county governments and profits to landowners upon the sale of these lands.

Structural installation will provide 19 man-years of new employment; operation and maintenance will provide 1.2 man-years of employment annually.

Rural area development will be advanced through increased farm incomes, higher land values, decreased flood expenses, and a more stable economy.

#### F. Adverse Environmental Effects

Agricultural use and terrestrial wildlife habitat will be permanently lost on 250 and 228 acres to be flooded by permanent sediment pools behind reservoirs and detention dams, respectively.

Periodic flooding of 572 acres on retarding areas of structural measures and 831 acres on retarding areas of the detention dams will interrupt and reduce agricultural and wildlife uses.

Agricultural and wildlife uses and 1 acre of woodland will be lost on 127 acres to be occupied by dams and spillways.

Loss of agricultural use will occur on 507 additional acres to be managed primarily for public recreation and wildlife habitat.

During installation of structural measures, 9 acres of woodlands will be removed; a total of 30 acres of woodlands will be either cleared, reduced, or affected by periodic flooding. Initially, clearing of brush and woodlands will decrease nesting habitat for some species of song birds.

Aesthetic values will decrease for residents adjacent to the public recreation area. Traffic, litter, and noise will increase.

During drought periods, low flows in stream reaches below the reservoirs will be reduced if releases are not made.

An estimated 15 persons will have to either relocate or accept a reduced size of their farmlands.

Any archeological remains located at the reservoir sites will be damaged or destroyed unless salvaged upon discovery.

#### VI. ALTERNATIVES

A matrix (pp. 62-63) was designed to display all alternatives which were considered during the formulation of the project plan. A total of 21 alternatives were devised from various combinations of land treatment, flood plain management, and struc-These alternatives were then analyzed for the tural measures. physical and economic feasibility, source following factors: of authority, availability of local sponsorship, effect on adverse impacts, viability, and cost. A viable alternative was defined as one which was physically feasibly and could be carried out under some existing authority, though not necessarily P. L. 566. Cost estimates were included for only those alternatives which were viable and which would have reduced or eliminated adverse impacts of the proposed project. Thus, only those alternatives which received cost estimates were considered further and are discussed in the following narrative.

Alternative No. 3 proposed accelerated land treatment, the multiple-purpose reservoir, and two floodwater retarding structures with dry-pool storage instead of water storage. A 59% reduction in average annual flood damages would occur. In Newton, flood protection would be equal to the 100-year flood frequency level. Soil, water, and plant management status would be improved by land treatment on 26,990 acres. There would be 1,195 acres for public recreation and open space, including a 195-acre public reservoir providing warm-water fishing and water-based recreation. An estimated 60,000 annual recreation visits would be available. tion would occur on 4.5 miles of stream channel and 1,886 acres of agricultural and wildlife habitat land (236 acres from sediment pools, 1,455 acres from retarding pools, and 195 acres from the multiple-purpose reservoir). Total land conversions would result in the loss of 2,252 acres of cropland, 809 acres of rangeland, and 27 acres of woodland; added would be 950 acres of hayland, 80 acres of pastureland, 1,773 acres for wildlife and recreation, and 285 acres of other land uses. The average annual sediment yield to the mouth of Sand Creek would be reduced 55%. Floodwaters would contain suspended sediments which would be deposited in impoundments and exposed following discharge of floodwaters. This alternative would cost \$2,904,600.

Alternative No. 4 proposed extensive land treatment measures, including the 19 small detention dams, with no additional structural measures. A 30% reduction in average annual flood

# MATRIX ANALYSIS TO IDENTIFY VIABLE $\frac{a}{}$ ALTERNATIVES WHICH REDUCE OR ELIMINATE ADVERSE IMPACTS OF PLANNED PROJECT (X = yes, 0 = no)

e ^					<u>Feasibility</u> <u>Author</u>				ority	nsorship		Effect on Adverse Impacts			
Alternative No.	_Cor		MP-REC	lternative t FP-MGT CW Z P I	Physical	Financial	IP. L. 566	Other	Local Spons Available	Eliminate	Reduce	Increase	Viable	Cost (§)	
1.	Х	Х	х		Additional small FRS	х	0	0	х	х	0	O	x	х	<u>b</u> /
2.	х		х		One large multiple- purpose site on main- stream of Sand Creek	х	х	x	х	0	0	0	Х	Х	<u>b</u> /
3.	X	Х	х		Dry-pool storage in FRS	х	Х	Х	х	Х	0	х	0	х	2,904,600
4.	Х				Only LT including 19 detention dams	x	х	х	х	х	х	Х	0	х	1,475,400
5.	Х	х	х		Develop Sites 2 and 3 for recreation instead of Site 1	0	0	0	0	0	0	Х	0	0	<u>b</u> /
6.	х			Х	LT and channel work extending from Newton into rural areas	х	х	0	х	х	0	0	x	х	<u>b</u> /
7.	х	Х	х	Х	Planned project plus channel work into rural areas	х	0	0	х	х	0	0	х	Х	<u>h</u> /
8.	х			х	Zoning to restrict agricultural use of flood plain	x	0	0	O	0	Х	х	o	0	<u>b</u> /
9.	х			х	Zoning to restrict urban buildup in flood plain	х	Х	х	х	х	Х	Х	0	х	≥1,475,400 <u>¢</u> /
10.	Х		х		Planned project less Sites 2 and 3	х	х	Х	х	Х	0	Х	0	х	2,680,300
11.	Х	Х			Eliminate recreation purpose from Site 1	х	Х	x	х	х	0	Х	0	Х	2,296,300
12.	Х		х	Х	Channel work into rural areas	x	х	x	х	х	0	0	х	Х	<u>b</u> /
13.				х	Only channel work	х	х	0	х	х	0	0	Х	х	<u>b</u> /

# MATRIX ANALYSIS TO IDENTIFY VIABLE ALTERNATIVES WHICH REDUCE OR ELIMINATE ADVERSE IMPACTS OF PLANNED PROJECT (Concluded) (X = yes, 0 = no)

Alternative No.		mpone FRS	nts of A		FP-MGT	Planned Project Other Description	Physical especial idisability	Financial Atil	P. L. 566	Other	Local Sponsorship Available		ffect Advers Impact	se	Viable	Cost (\$)
_				===	=			_				_		_		
14.			Х			Planned project less LT and FRS	Х	Х	0	Х	Х	0	Х	0	Х	1,204,900
15.						Single-purpose recreation site	х	х	()	х	Х	0	х	0	Х	1,159,000
16.	х	х	Х		х	Zoning to restrict urban buildup in flood plain	X	Х	х	х	Х	0	0	O	Х	<u>h</u> /
17.	x		х		х	Zoning to restrict urban buildup in flood plain	х	Х	х	х	Х	0	Х	O	х	≥2,680,300 <u>c</u> /
18.	х				Х	Single-purpose recreation site: pur- chase flood plain to restrict agricultural us	X se	0	0	х	0	х	х	0	Х	5,204,400
19.	х				Х	Purchase easement and convert 400 acres of flood plain scour channe to perennial cover	X :ls	О	X	х	O	Х	χ	0	х	1,686,200
20.	х				х	Single-purpose recreation site; flood plain insurance	x	х	Х	Х	х	Х	х	0	х	≥2,634,400 <u>e</u> /
21.						No action. Continuing land treatment program would not be accelerated	-	-	-	-	-	Х	Х	0	-	-

a/ A viable alternative is defined as one which is physically feasible and can be carried out under some existing authority (not necessarily P. L. 566).

 $<sup>\</sup>underline{b}/$  Cost estimates are included only for viable alternatives which reduce or eliminate adverse impacts of the proposed project.

<sup>&</sup>lt;u>c</u>/ Cost estimates for flood plain management programs are unknown. Costs are shown as equal to or greater than costs for the nonmanagement components of the alternative.

LT - Land treatment (includes ongoing program plus accelerated program and 19 small detention dams)

FRS - Floodwater retarding structure

MP-REC - Multiple-purpose floodwater retarding - recreation water supply structure including recreation facilities CW - Channel work

I - Insurance

FP-MGT - Flood plain management

Z - Zoning

P - Purchase

damages would result. The level of flood protection in Newton would be slightly less than the 100-year flood frequency level. Soil, water, and plant management status would be improved by land treatment on 26,990 acres. Inundated would be 233 acres from sediment pools and 831 acres from periodic flooding of retarding areas. Total land conversions would result in the loss of 1,422 acres of cropland and 245 acres of rangeland; added would be 950 acres of hayland, 80 acres of pastureland, 317 acres for wildlife and recreation, 10 acres of woodland, and 310 acres of other land uses. The average annual sediment yield to the mouth of Sand Creek would be reduced 47%. This alternative would cost \$1,475,400.

Alternative No. 9 was to use land treatment measures, including the 19 detention dams, in combination with zoning to restrict urban encroachment on the flood plain. A 30% reduction in average annual flood damage would occur. The level of flood protection in Newton would be slightly less than the 100-year flood frequency level. Unwise development and future increases in urban flood damages would be prevented through restrictive zoning. Requirements of Public Laws 90-448 and 93-234 will help serve to prevent further development of flood prone areas in urban communities, and these communities will be required to apply for flood insurance and adopt flood plain management programs. Under this alternative, soil, water, and plant management status would be improved by land treatment on 26,990 acres. Inundated would be 233 acres from sediment pools and 831 acres from periodic flooding of retarding areas. Total land conversions would result in the loss of 1,422 acres of cropland and 245 acres of rangeland; added would be 950 acres of hayland, 80 acres of pastureland, 317 acres for wildlife and recreation, 10 acres of woodland, and 310 acres of other land uses. average annual sediment yield to the mouth of Sand Creek would be reduced 47%. The cost of this alternative would be \$1,475,400 for the land treatment measures, plus an undetermined amount for flood plain management implementation.

Alternative No. 10 proposed the land treatment measures and the multiple-purpose structure without floodwater retarding Structures Nos. 2 and 3. A 50% reduction in average annual flood damages would be achieved; protection in Newton would be slightly less than the 100-year flood frequency level. Soil, water, and plant management status would be improved by land treatment on 26,990 acres. There would be 1,195 acres for public recreation

and open space, including a 195-acre public reservoir providing warm-water fishing and water-based recreation. Estimated annual recreation visits would be 60,000. Inundated would be 4.5 miles of stream channel and 1,694 acres of agricultural and wildlife habitat land (233 acres from sediment pools, 195 acres from the multiple-purpose reservoir, and 1,266 acres from periodic flooding of retarding areas). Total land conversions would result in the loss of 2,169 acres of cropland, 690 acres of rangeland, and 23 acres of woodland; added would be 950 acres of hayland, 80 acres of pastureland, 1,562 acres for wildlife and recreation, and 290 acres of other land uses. The average annual sediment yield to the mouth of Sand Creek would be reduced 53%. This alternative would cost \$2,680,300.

Alternative No. 11 consisted of the planned project without recreation development at Site No. 1. There would be a 59% reduction in average annual flood damages. Flood protection in Newton would be equal to the 100-year flood frequency level. Soil, water, and plant management status would be improved by land treatment on 26,990 acres. Inundated would be 6.3 miles of stream channel, 418 acres from sediment pools, and 1,403 acres from periodic flooding of retarding areas. Total land conversions would result in the loss of 2,228 acres of cropland, 773 acres of rangeland, and 24 acres of woodland; added would be 950 acres of hayland, 80 acres of pastureland, 1,708 acres for wildlife and recreation, and 287 acres of other land uses. The average annual sediment yield to the mouth of Sand Creek would be reduced 55%. This alternative would cost \$1,991,900.

Alternative No. 14 was to install only the multiple-purpose reservoir, without accelerated land treatment and the two floodwater retarding structures. The current land treatment program would continue, however, including the eventual installation of 11 detention dams. This alternative would produce a 38% reduction in average annual flood damages. The level of flood protection in Newton would be slightly less than the 100-year flood frequency level. There would be 1,195 acres for public recreation and open space, including a 195-acre public reservoir providing warm-water fishing and water-based recreation. Estimated annual recreation visits would be 60,000. Inundated would be 4.5 miles of stream channel and 1,201 acres of agricultural and wildlife habitat land (90 acres from sediment pools of the 11 detention dams, 195 acres from the multiple-purpose reservoir, and 916 acres from periodic flooding of retarding areas). Total land conversions would result in the loss of 1,007 acres of cropland,

504 acres of rangeland, 33 acres of woodland, and 20 acres of other land uses; added would be 2,060 acres for wildlife and recreation. The average annual sediment yield to the mouth of Sand Creek would be reduced 6%. This alternative would cost \$1,204,900.

Alternative No. 15 was to install only a single-purpose recreation site. Average annual flood damage reduction would be 36%, a result of the continuing (but not accelerated) land treatment program and incidental floodwater protection at the single-purpose reservoir. There would be 1,195 acres for public recreation and open space, including a 195-acre public reservoir providing warm-water fishing and water-based recreation. annual recreation visits would be 60,000. Inundated would be 4.5 miles of stream channel and 1,176 acres of agricultural and wildlife habitat land (90 acres from sediment pools of the 11 detention dams, 195 acres from the recreation reservoir, and 891 acres from periodic flooding of retarding areas). Total land conversions would result in the loss of 991 acres of cropland, 496 acres of rangeland, 32 acres of woodland, and 20 acres of other land use; added would be 1,439 acres for wildlife and The average annual sediment yield to the mouth of Sand Creek would be reduced 34%. This alternative would cost \$1,159,000.

Alternative No. 17 proposed land treatment measures, the multiple-purpose structure, and zoning to restrict urban use of the flood plain. Average annual flood damages would be reduced Flood protection for Newton would be slightly less than the 100-year flood frequency level. Unwise flood plain development and future increases in urban flood damages would be prevented, as construction on flood prone areas would be restricted or limited to flood proof types of construction. As stated previously, requirements of Public Laws 90-448 and 93-234 will help prevent further development of flood prone areas in urban communities by requiring these communities to apply for flood insurance and adopt flood plain management programs. Soil, water, and plant management status would be improved by land treatment on 26,990 There would be 1,195 acres for public recreation and open space, including a 195-acre public recreation reservoir. Estimated annual recreation visits would be 60,000. Inundated would be 4.5 miles of stream channel and 1,694 acres of agricultural and wildlife habitat land (233 acres from sediment pools, 195 acres from the multiple-purpose reservoir, and 1,266 acres from periodic flooding of retarding areas). Total land conversions

would result in the loss of 2,169 acres of cropland, 690 acres of rangeland, and 23 acres of woodland; added would be 950 acres of hayland, 80 acres of pastureland, 1,562 acres for wildlife and recreation, and 290 acres of other land uses. The average annual sediment yield to the mouth of Sand Creek would be reduced 53%. This alternative would cost \$2,680,300 plus an undetermined amount for flood plain management implementation.

Alternative No. 18 was to use land treatment measures, a single-purpose recreation site, and purchase of the agricultural flood plain lands. A 90% reduction in average annual flood damages would be achieved; increased damages on agricultural flood plain lands would be prevented. The level of flood protection in Newton would be slightly less than the 100-year flood frequency level. Soil, water, and plant management status would be improved by land treatment on 26,990 acres. Wildlife habitat would be improved by reestablishing native vegetation and installing wildlife management on 4,300 acres of purchased flood plain land, and by a wildlife management area within the 1,195-acre singlepurpose recreation area. A total of 5,495 acres would be available for public recreation and open space, including a 195-acre reservoir for warm-water fishing and water-based recreation. The recreation site would provide 60,000 annual recreation visits; public assess along 21.1 miles of Sand Creek would provide 25,000 additional recreation visits. Use of the flood plain area for recreation would change the small town environment and decrease the tranquility of the rural area. quality of 128 acres of riparian habitat would deteriorate due to unrestricted public access. Inundated would be 4.5 miles of stream channel and 1,669 acres of agricultural and wildlife habitat land (233 acres from sediment pools, 195 acres from the recreation reservoir, and 1,241 acres from periodic flooding of the retarding areas). The flood plain purchase would convert 3,403 acres of cropland, 688 acres of rangeland, 88 acres of woodland, and 121 acres of other land to public recreation, open space, and wildlife habitat. The land treatment measures and the single-purpose recreation site would result in the loss of 2,153 acres of cropland, 682 acres of rangeland, and 22 acres of woodland. There would be a gain of 950 acres of hayland, 80 acres of pastureland, 1,537 acres for wildlife and recreation, and 290 acres of other uses. The average annual sediment yield to the mouth of Sand Creek would be reduced 47%. The cost of this alternative would be \$5,204,400.

Alternative No. 19 suggested using land treatment measures plus the purchase of flowage easements on the flood plain to convert 400 acres of flood plain scour channel to perennial cover. Flood plain damage would be reduced by 39%. The level of flood protection in Newton would be slightly less than the 100-year flood frequency level. Soil, water, and plant management status would be improved by land treatment on 26,990 acres. habitat would be improved by purchasing easements on 400 acres and reestablishing native vegetation on this land. would be 233 acres from sediment pools and 831 acres from retarding areas. Land treatment measures would result in the loss of 1,422 acres of cropland and 245 acres of rangeland; added would be 950 acres of hayland, 80 acres of pastureland, 317 acres for wildlife and recreation, 10 acres of woodland, and 310 acres of other uses. Agricultural production would be foregone on the 400 acres purchased for flowage easements. This alternative would cost \$1,686,200.

Alternative No. 20 was to use land treatment measures, a single-purpose recreation site, and flood plain insurance. Average annual flood damages would be reduced by 48%. The city of Newton would be protected to slightly less than the 100-year flood frequency level. Owners of existing structures would be able to buy flood damage protection at reduced rates; insurance payments for losses would assist the landowners in repairing flood damages. Requirements of Public Laws 90-448 and 93-234. previously described, will require landowners in flood prone areas to apply for flood insurance. Soil, water, and plant management status would be improved by land treatment on 26,990 There would be 1,195 acres for public recreation and open space, including a 195-acre public reservoir providing warm-water fishing and water-based recreation. Estimated annual recreation visits would be 60,000. Inundated would be 4.5 miles of stream channel and 1,669 acres of agricultural and wildlife habitat land (233 acres from sediment pools, 195 acres from the recreation reservoir, and 1,241 acres from periodic flooding of retarding areas). Total land conversions would result in the loss of 2,153 acres of cropland, 682 acres of rangeland, and 22 acres of woodland; added would be 950 acres of hayland, 80 acres of pastureland, 1,537 acres for wildlife and recreation, and 290 acres of other land uses. The average annual sediment yield to the mouth of Sand Creek would be reduced 53%. This alternative would cost \$2,634,400.

Alternative No. 21 was to take no action. The land treatment program would continue without acceleration; 11 of the 19 detention

dams would be built under the ongoing program. There would be a 19% reduction in average annual flood damages. Sediment pools of detention dams would inundate 90 acres of agricultural and wildlife habitat; retarding areas would periodically flood 481 acres. Average net project benefits from flood damage reduction, land use intensification, off-project benefits, water storage, recreation, and secondary benefits would be foregone.

#### VII. SHORT-TERM VS LONG-TERM USE OF RESOURCES

Land use has stayed essentially constant within the water-shed, with cropland and grassland constituting over 90% of the land. This pattern is expected to continue, with the exception of some urban expansion in the immediate vicinity of population centers. The number of farms is decreasing by about 1%/year; however, this trend is expected to decrease or reverse due to the growing appeal of a rural environment to urban residents.

The project will reduce options for long-term land uses only on the areas incorporated into the dams, spillways, sediment pools, floodwater retarding areas, or the multiple use reservoir. The proposed project is compatible with long-term land use trends in this watershed, and will help stabilize the economic system of the area.

The structural measures of the project are expected to continue to provide some flood prevention and sediment control after the end of their assigned life, if hydrologic conditions are not substantially altered.

Sand Creek Watershed lies in the Kansas subregion of the Arkansas-White-Red Water Resource Region designated by the Water Resources Council. 6/ The "Arkansas River Basin in Kansas"45/ report shows 81 feasible P. L. 566 projects. The total area for these projects is 15,674 sq miles, or 37% of the Kansas portion of the Arkansas River Basin. Applications for P. L. 566 assistance have been received for 51 of these projects, which would cover 10,826 sq miles. Eleven projects have been completed; 14 are authorized for construction; and 11 (including this project) are authorized for planning.

Installation of the works of improvement on all 81 feasible watershed projects would benefit 668,000 acres of flood plain land. In the proposed reservoirs, the combined storage capacities would be 224,900 acre-ft for sediment, 1,070,500 acre-ft for floodwater detention, and 65,300 acre-ft for multiple use.

At present, land use in the Kansas portion of the Arkansas River Basin is 57% cropland, 35% rangeland, 2% woodland, and 6% other uses. Cumulative effects from the 81 feasible watershed projects would convert a total of 32,600 acres to water storage,

and thus increase the amount of land in the category of "other use" by 0.1%.

There are several possible effects of this project outside the watershed area. The basin report estimates a 60% population increase by the year 2000. This project would help meet the basin's increased recreation needs. Secondly, the passage of goods through the watershed would be more effectively maintained because of flood protection afforded rail and highway facilities. Finally, the sediment yield contributed by Sand Creek to the Little Arkansas River would be reduced.

#### VIII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Agricultural use and wildlife habitat will be lost on 250 acres to be inundated by sediment and permanent pools from the three structural measures. Similarly, these uses will be lost on 228 acres in the sediment pools of the 19 detention dams. An additional 572 acres and 831 acres in the floodwater retarding areas of the reservoir structures and detention dams, respectively, will be periodically flooded, which will reduce agricultural and wildlife habitat uses of these areas. The 127 acres to be used for dams and spillways will be lost for wildlife use until some of the areas are revegetated following construction. Inundation will occur on 6.5 miles of intermittent stream channel.

Present uses of the lands to be used for the three structural measures are as follows:

	Present Land Use												
Structural Measure	Cropland	Rangeland	Woodland	Other	Total								
Sediment and													
Permanent Pools	7 <b>7</b>	159	8	6	250								
Detention Pools	344	193	21	14	572								
Dams and Spillways	113	12	1	1	127								
Total	534	364	30	21	949								

Construction of the P. L. 566 structures will require 19 man-years of new employment, and operation and maintenance of the structures and recreation facilities will require 1.2 man-years of employment annually. Total project installation cost will be \$2,639,400.

Installation of the structural measures of this project will require 65,000 gal. of diesel fuel.

### IX. CONSULTATION AND REVIEW WITH APPROPRIATE AGENCIES AND OTHERS

#### Genera1

In 1962 the Sand Creek Watershed Steering Committee made a request to the State Division of Water Resources for assistance in establishing definitive watershed boundaries. The following year, this committee requested a preliminary feasibility study prior to proceeding with the formal organization of a watershed district.

Petitions calling for the formation of a district carried 171 signatures. On April 16, 1965, watershed residents voted 2,618 to 909 in favor of district formation. A certificate of incorporation for Sand Creek Watershed Joint District No. 68 was granted by the Secretary of State on April 26, 1965.

An application for assistance under the P. L. 566 Watershed Protection and Flood Prevention Act was filed with the Governor's Watershed Review Committee on October 4, 1965. The application was sponsored by the Harvey County Conservation District, Marion County Conservation District, and Sand Creek Watershed Joint District No. 68.

The Governor's Watershed Review Committee requested a field examination, which was conducted on November 16, 1965. A published notice announced the examination and invited public attendance. The examination consisted of a tour of the watershed followed by a meeting with the sponsors and other community leaders. The Governor's Watershed Review Committee Field Inspection Team, the Soil Conservation Service, the Forest Service, the Agricultural Extension Service, the Watershed District and interested individuals were all represented in this study. The field examination showed that a flood prevention and watershed treatment program with some recreational development was needed.

The application for assistance in planning and carrying out works of improvement under the P. L. 566 Act was approved by the Governor's Watershed Review Committee on January 3, 1966. The application was then filed with the Soil Conservation Service.

On July 28, 1967, the Governor's Watershed Review Committee recommended the Sand Creek Watershed for planning and assigned Priority No. 52.

Pursuant to the application for assistance, representatives of the Watershed Planning Staff from the Soil Conservation Service, Salina, Kansas, made a reconnaissance of the watershed on January 24, 1968. These representatives included planning specialists in hydrology, geology, engineering, and economics. A preliminary investigation report was subsequently prepared for the sponsors. Sponsors agreed to proceed with planning based upon this preliminary information. A news item in the Newton local newspaper, The Kansan, informed the public of preliminary project objectives and the probable scope of planned works of improvement.

A request to the Administrator of the Soil Conservation Service for authorization to provide planning assistance to Sand Creek Watershed District was made on April 25, 1968. This authorization was granted on July 15, 1968, under the authority of the Watershed Protection and Flood Prevention Act.

On March 10, 1970, the SCS Watershed Planning Staff met with sponsors to report the planning progress. This meeting was the last of a series of meetings beginning July 15, 1968, designed to prepare the Watershed District Board of Directors for their responsibilities in formulating a project. Presentations were given by each staff specialist to acquaint district board members with procedures used in developing planning data. Average annual flood damages and potential benefits of the flood protection program were presented with visual aids. Procedures for developing structure designs and cost estimations were explained. As in earlier meetings, information useful to district board members in selecting structure sites was discussed.

On March 11, 1970, the Watershed District Board formulated a program of flood control and land treatment measures. The board further decided to expand objectives to include public recreation in a multiple-purpose structure at Site No. 1.

Since submitting its application for assistance through the P. L. 566 Watershed Act in October 1965, the Watershed District Board has carried out a continuing information exchange program with the general public. Some of these activities are listed below:

- 1. Ninety-two regular monthly meetings open to the public have been held. Specialists have usually been available to discuss specific planning problems.
- 2. Seven annual meetings, advertised in advance in the principal county newspaper, have been conducted.
- 3. Several meetings have occurred between board representatives and officials of the townships, state and county highway departments, and the City of Newton.
- 4. Frequent person-to-person contacts have been made between watershed directors and individual farmers in order to explain the program and encourage the application of land treatment measures. Most of the farmers within the watershed have been contacted in this manner.
- 5. A part-time field representative has been employed by the district to help farmers apply land treatment measures.
- 6. Seven tours to other watersheds have been sponsored by the district board.
- 7. Seven public informational meetings have been conducted, and a public hearing on the general plan was held November 8, 1973.
- 8. A booth to promote watershed management has been displayed each year for 8 years at the Harvey County Fair.

The sponsoring conservation districts are in full support of the proposed watershed program. News media, business people, and others, such as a local flood control association and a Mennonite church relief group, are giving substantial backing to the project objectives. There has been considerable opportunity for residents and landowners in the watershed to participate in formulating the project objectives.

During project formulation, the Bureau of Sport Fisheries and Wildlife, in cooperation with the Kansas Forestry, Fish and Game Commission and the Soil Conservation Service completed a detailed study of the proposed project area. Their ensuing report on fish and wildlife mitigation and enhancement measures (Appendix A, p. 82) was incorporated into project planning.

A Forestry Work Plan was developed by the State Extension Forester, Kansas State University, Manhattan, Kansas, and the Forest Service and was also included in the final project.

The Kansas State Historical Society and the Kansas State Archeologist were consulted to determine present historic and archeological resources in the watershed and the impact of the proposed project on those resources (Appendix K, p. 141).

A public meeting was held on August 28, 1974, in Harvey County Courthouse to discuss the draft watershed work plan and environmental impact statement. Over 100 persons attended the meeting.

Introductions were made and copies of the work plan and environmental impact statement were distributed. It was explained that the work plan was required for congressional authorization of the project, and the environmental impact statement was designed to inform the public of the project's environmental effects. The role of Sand Creek Watershed in the overall state watershed program was briefly described, and the watershed sponsors were mentioned. Responsibilities of the Soil Conservation Service, the Watershed District, the City of Newton, and Harvey and Marion County Conservation Districts in all phases of the program were pointed out.

Sections of the work plan were reviewed, including the works of improvement to be installed, estimates of costs, effects of the project, benefits, and provisions for financing and operation and maintenance. Tables, maps, and diagrams were reviewed.

Because of its similarity with the work plan, the environmental impact statement was not discussed in depth. However, reference was made to page 5 and the list of alternatives was explained.

A question and answer session concluded the meeting. A tape recording and transcript of the meeting were made and are available at the SCS office in Newton.

The following agencies, conservation groups, and organizations were asked to comment on the draft environmental impact statement (transmittal letters were dated December 13, 1974; comments were received by February 17, 1975):

- \* U.S. Department of the Army
- \* U.S. Department of the Interior
  - U.S. Department of Commerce
- \* U.S. Department of Health, Education, and Welfare
- \* U.S. Department of Transportation Office of Equal Opportunity, U.S.D.A.
- \* Governor of Kansas
- \* Budget Division, Department of Administration, State of Kansas (Clearinghouse)
- \* Environmental Protection Agency Federal Power Commission
- \* Advisory Council on Historic Preservation
- \*\* State Historic Preservation Officer
  Natural Resources Defense Council
  Friends of the Earth
  Environmental Defense Fund
  National Wildlife Federation
  National Audubon Society
  Environmental Impact Assessment Project
  - \* Response received.
- \*\* Commented on field level review draft.

Each environmental issue, problem, or objection raised during the formal interagency review of the draft environmental impact statement and work plan is summarized in the following discussion:

#### Environmental Protection Agency (Comments dated February 14, 1975)

<u>Comment</u> - It was suggested that the SCS request the Kansas Department of Health and Environment to determine if the water in the proposed multiple-purpose reservoir would be of sufficient quality to achieve the class A water designation, and include this determination in the final statement.

<u>Disposition</u> - The Kansas Department of Health and Environment was contacted as suggested. Changes were made in the EIS to reflect the response. This exchange of correspondence is included with the EPA comments in Appendix O.

<u>Comment</u> - The draft statement did not discuss the impact of the two floodwater retarding structures and the multiple-purpose structure on low flows in Sand Creek.

<u>Disposition</u> - Changes were made to reflect additional discussion with the Kansas Division of Water Resources and are intended to clarify responsibilities regarding reservoir releases during drought periods. Additions were made to provide a clearer explanation of pre-project and expected post-project low flow conditions.

<u>Comment</u> - It was suggested that the alternatives discussion include reasons for not selecting each alternative.

<u>Disposition</u> - Paragraph 2 under "VI. Alternatives", p. 19659 of the SCS guidelines for preparation of EIS's, published in the <u>Federal Register</u>, Part 650, dated June 3, 1974, states in part: "Justification statements for the nonselection of an alternative should not be included, but the key facts should be presented to enable the reader to judge the relative merits of each alternative." No changes were made in the alternatives discussion.

Concurrence or comment on the final EIS with the above changes was requested from the EPA. Their response indicated their concerns had been resolved to their satisfaction and is included in Appendix O.

## Advisory Council on Historic Preservation (Comments dated January 7, 1975)

<u>Comment</u> - If cultural remains discovered during construction are determined to be eligible for inclusion in the National Register of Historic Places, the SCS is required to request Council comments in accordance with the "Procedures for Protection of Historic and Cultural Properties" (36 CFR Part 800).

<u>Disposition</u> - A sentence noting the Service's responsibility was added to the EIS and to the work plan.

## Kansas Forestry, Fish and Game Commission - Through the State Clearinghouse (Comments dated February 4, 1975)

<u>Comment</u> - It was suggested that the wildlife management area at Site No. 1 be open to public hunting on a mandatory basis as a

mitigation measure. Beneficial impacts to migratory waterfowl were questioned.

<u>Disposition</u> - These comments were withdrawn following additional coordination between the Service and Commission personnel. It is agreed that no new waterfowl will be produced by the project and it is recognized that the impoundments will attract waterfowl and that waterfowl will use them.

Comment - Cheney Reservoir was built by the Bureau of Reclamation.

Disposition - The change was made as suggested.

#### U.S. Department of the Interior (Comments dated March 6, 1975)

Comment - Any effect, direct or indirect, beneficial or adverse, which is expected to occur on sites within the watershed which are listed or eligible for listing in the National Register of Historic Places should be discussed in accordance with 36 CFR 800 procedures.

<u>Disposition</u> - The work plan was reworded to state that no effects are expected to occur.

Comment - It was suggested that further consultation be affected with the State Historic Preservation Officer in order to determine whether any sites have been added to the National Register since 1972 or may now be under consideration for inclusion.

<u>Disposition</u> - The State Historic Preservation Officer commented on the field level draft. A reference to the National Register of Historic Places which was published in the <u>Federal Register</u> of February 4, 1975, was added.

Comment - In the event that lands to be used for recreation facilities adjacent to Structure No. 1 were not covered by the preliminary archeological reconnaissance, the State Archeologist should be consulted further.

<u>Disposition</u> - The recreation facilities area was covered by the reconnaissance as stated in the EIS. No further action was taken.

<u>Comment</u> - It was suggested that the State Archeologist be consulted concerning the need for an archeological survey of the 19 detention dams included in the land treatment measures.

Disposition - The 19 detention dams are a part of the land treatment program to be installed with local, state and federal cost sharing other than P.L. 566. Local sponsors and landowners plan to build these dams irrespective of installation of the P.L. 566 structures. The detention dams are not a prerequisite for construction of the P.L. 566 structures. The detention dams are each less than 40 surface acres in size (and average 12 acres). It is Service policy to notify the State Archeologist if historical or archeological materials are found during construction. Significant finds will be reported to the State Archeologist and the National Park Service. No further action will be taken regarding this comment.

#### X. LIST OF APPENDICES

- Appendix A Personal Communication from the U.S. Department of the Interior, Fish and Wildlife Service
- Appendix B Chemical Analyses of Ground Water (Wells) in the Sand Creek Watershed
- Appendix C Kansas State Board of Health Regulations
- Appendix D Water Analyses of Sand Creek (Harvey County, Kansas)

  Seven Miles Downstream from Newton, Kansas, Sewage
  Plant Outfall
- Appendix E Water Analyses Sand Creek
- Appendix F Livestock Operations in the Sand Creek Watershed:

  Number of Livestock Farm Operations and Animals

  Per Year
- Appendix G Fish of the Sand Creek Area, Kansas
- Appendix H Amphibians and Reptiles of Sand Creek Area, Kansas
- Appendix I Birds of Sand Creek Vicinity
- Appendix J Mammals with a Geographical Range Including the Project
  Area
- Appendix K Personal Communication From Kansas State Historical Society and Kansas State Archeologist

- Appendix L Planned Land Treatment Measures for Sand Creek Watershed
- Appendix M Facilities to be Installed at the Recreational Development, Sand Creek Watershed
- Appendix N Comparison of Benefits and Costs for Structural Measures
- Appendix 0 Letters of Comment Received on Draft Environmental Impact Statement

Appendix P - References and Maps

Approved by

State Conservationist

Date

#### APPENDIX A

PERSONAL COMMUNICATION FROM THE U.S. DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE



# UNITED STATES DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE

BUREAU OF SPORT FISHERIES AND WILDLIFE
POST OFFICE BOX 1306
ALBUQUERQUE, NEW MEXICO 87103

August 14, 1973

Mr. Robert K. Griffin State Conservationist Soil Conservation Service Post Office Box 600 Salina, Kansas 67401

Dear Mr. Griffin:

The Bureau of Sport Fisheries and Wildlife in cooperation with the Kansas Forestry, Fish and Game Commission and your Service has completed a detailed study of the proposed Sand Creek Watershed in Harvey and Marion Counties, Kansas. The project is sponsored by the Sand Creek Watershed Joint District No. 68 and the respective Soil Conservation Districts of the counties, in cooperation with the Soil Conservation Service, under the authority of the Watershed Protection and Flood Prevention Act (68 Stat. 666, as amended; 16 U.S.C. 1008).

This letter is our Bureau's report on the proposed project, prepared in accordance with the provisions of Section 12 of the above Act. It was prepared in cooperation with personnel of the Kansas Forestry, Fish and Game Commission and has received the concurrence of that Commission as indicated in the enclosed copy of a letter dated March 26, 1973, signed by Director Richard D. Wettersten. The report includes changes reflecting the comments referred to in Director Wettersten's letter.

Sand Creek Watershed is located in east-central Kansas, approximately 26 miles north of Wichita. The cities of Newton and North Newton, with a combined population of 16,400 people, are in the central portion of the watershed. The area lies on the eastern edge of the Great Bend Prairie where the topography is quite flat except for the moderate cuts made by the Arkansas River and its tributaries.

Sand Creek Watershed, with an area of 64,134 acres, is drained entirely by Sand Creek which flows into the Little Arkansas River near the town of Sedgwick. The Little Arkansas River is tributary to the Arkansas River.

RB

The watershed area supports extensive croplands, with the major cash crops being wheat and soybeans. Approximately 78 percent of the watershed is cropland; 13 percent, pasture; and 9 percent in miscellaneous uses. Woodlands occupy only 300 acres, or less than 0.5 percent of the watershed area.

The average annual precipitation at Newton is 30.50 inches, with a range of 13.39 to 51.50 inches.

High-intensity storms of short duration are common and often cause floods. Watershed problems consist mainly of floodwater damages to agricultural crops and farm properties, roads, bridges, and a railroad.

The project proposes construction of two floodwater retarding structures, Structures Nos. 2 and 3, and a multiple-purpose impoundment for flood control and recreation, Structure No. 1. The two floodwater retarding structures would have sediment pools of 20 and 35 surface acres, respectively.

Land treatment measures designed to reduce the rate of runoff are included in project plans. There are no channel improvements planned with the project.

The city of Newton and the Sand Creek Watershed Joint District No. 68 would cost-share the recreation pool and associated facilities of the multiple-purpose flood-control structure under the provisions of the Watershed Protection and Flood Prevention Act. This reservoir would be located in Section 3, Township 22 South, Range 2 East, about 8 miles north of Newton. The recreation pool would have a surface area of approximately 195 acres. The dam would have a maximum height of 40 feet. The sponsors have agreed to cost-share in the purchase of about 1,000 acres of additional land for the development of fish and wildlife and recreation areas around the reservoir. A total of 385 acres would be developed for recreation, with various public-use facilities included. The remaining 1810 acres would include the dam area, spillway, and other lands and water designated for fish and wildlife management. Suitable gamefish species would be stocked in the reservoir.

A general determination of lands to be purchased in fee title has been made although small changes may occur. This may necessitate minor alterations of the map for structure site No. 1. Whereas the appearance of the map may change slightly, the overall planning concepts designed to promote fish and wildlife interests will not undergo appreciable change. With proper management and development of facilities, it is estimated that 50,000 visitors annually would use this area.

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Permanent pool areas on the small intermittent tributaries in the watershed offer limited streamfishing for channel catfish, bullheads, and various species of nongame fish. Most of the fishing in the watershed occurs on private farm ponds. Nearby Cheney and Marion Reservoirs provide other fishing opportunity for people living in the watershed.

The project would not significantly affect the stream fishery. At the present time, stream fish habitat at the three floodwater retarding structure sites is nonexistent. The sediment pools of two proposed floodwater retarding structures have a potential for fishery management and would support warmwater fisheries until extensive sediment deposition occurs.

A limited amount of deer hunting, based on a permit drawing system, occurs in the general watershed area. Upland-game species in the watershed include the bobwhite quail, ring-necked pheasant, mourning dove, fox squirrel, and cottontail rabbit. Waterfowl hunting is usually good in the limited habitat available because of the duck and goose concentration at nearby Cheney and Marion Reservoirs. Fur animals such as mink, beaver, raccoon, opossum, muskrat, weasel, coyote, fox, and bobcat are found in the general watershed area.

Under project conditions, 250 acres of land would be inundated permanently by the pools of the three proposed structures. Of this total, 50 acres are good wildlife habitat, 90 acres are fair habitat, and 110 acres are marginal habitat. An additional 572 acres of land in the flood-detention pools also would be inundated occasionally. Small scattered areas totaling 124 acres (122 acres of pasture and 2 acres of woodland) located in the bottomlands below the structures would be sufficiently protected to warrant clearing for agricultural purposes after flood hazards are reduced. If this clearing occurs, wildlife habitat would be further reduced.

Generally, clean-farming practices of the project area have left little wildlife cover. In some instances, the bottomlands to be flooded provide the only available wildlife cover. Woodlands in these areas total 300 acres and include cottonwood, honey locust, red cedar, willows, American elm, ash, Russian olive, mulberry, and osage orange. These trees, together with their understory of shrubs, forbs, and grasses, lying adjacent to cropland, provide habitat needs for wildlife. Lack of vegetative cover of this type is a major limiting factor for game populations in this area. Loss of a few acres of cover reduces game populations over a greater acreage of surrounding lands. The 1968 Preliminary Investigation Report identified 1,173 acres as woodland. Land use conversions have since reduced this to 300 acres.

To maintain wildlife at present levels, it will be necessary to include measures for the protection or reestablishment of habitat in conjunction with project features. In order to adequately mitigate losses to existing wildlife habitat, the following measures should be implemented at the structure sites.

The dam and spillway fencing at all sites should be located and constructed in accordance with Soil Conservation Service specifications and as indicated on the enclosed structure site maps (Plates and 4). Fencing should be continuous and unbroken around the dam and spillway at sites Nos. 2 and 3. At site No. 1, the dam and spillway need not be fenced if the entire area acquired in fee title is fenced. Additional areas, designated by the encircled letters A, B, or C on the structure site maps for sites Nos. 2 and 3, should be included within the permanently fenced area. At site No. 1, areas at the west end of the dam, along and below the east end of the dam, and immediately around the spillway, should be considered as a part of the area provided for mitigation. The dam and spillway also would be a part of the mitigation area provided that these structures are seeded to herbaceous plants useful for wildlife cover.

The dam, spillway, and fenced wildlife areas should be seeded to a grass-legume mixture having wildlife value. Species selection should be coordinated with the Soil Conservation Service Range Conservationist and the Kansas Forestry, Fish and Game Commission. The planted areas would not be grazed, burned, hayed, mowed, or otherwise disturbed, unless deemed necessary to maintain the cover in optimum condition for wildlife usage.

Wherever possible, mature trees within the project area and particularly the fenced areas should be left for wildlife. Care should be taken at time of construction to insure that tree removal is held to the bare minimum. Areas of standing timber and brush below permanent pool elevation should remain as a benefit to the fisheries.

Two-row tree and shrub plantings, listed as "M" on the structure site maps, should be established at the locations shown. Species selection should be coordinated with the Kansas Forestry, Fish and Game Commission and the Soil Conservation Service Wildlife Biologist. These trees and shrubs should be clean cultivated until they are large enough to compete with weeds for sunlight and water. No grazing should be permitted on the tree and shrub sites.

The Kansas Forestry, Fish and Game Commission considers sharecropping of small-grain and feed-grain crops to be a practical means of obtaining wildlife food and habitat improvements at the site No. 1 mitigation area. Proposed sharecropping locations are designated as S.C. on Plate 2. Part or all of the sponsor's share should be left unharvested to provide wildlife food and winter cover. Grain in excess of wildlife needs might be sold and receipts used by the sponsors for improvement of wildlife habitat areas. The Kansas Forestry, Fish and Game Commission would provide technical advice and assistance concerning the kinds of crops and farming practices holding greatest advantage for wildlife. Sharecropping practices must include proper crop rotations to maintain soil productivity and stability.

The mitigation measures should be maintained for the life of the project, and the prescribed tree and shrub plantings should be maintained at a 75 percent survival rate for the first 5 years, and thereafter managed to allow for desirable natural growth and reproduction.

Certain recommendations are intended to be flexible. Tree and shrub species planted for wildlife cover, other than those specifically described, may be substituted if they produce similar desired effects and provided they are acceptable to the Kansas Forestry, Fish and Game Commission. Row-spacing may be changed when necessary to fit site conditions and the landowners' equipment.

Any changes made in the proposed mitigation measures, however, should first be cleared with the Kansas Forestry, Fish and Game Commission and the Bureau of Sport Fisheries and Wildlife.

The project also offers opportunity for enhancement of wildlife habitat at all sites by the inclusion of additional measures and operations in project planning and construction. Consideration of these additional proposals is strongly recommended.

For example, all cropland within a 2-foot vertical elevation of the sediment pool should be seeded to a stand of switchgrass. Also, during the years in which the farmer raises suitable crops adjacent to structures Nos. 2 and 3, he should be encouraged to leave several unharvested rows for wildlife food. Sharecropping all cropland acquired in fee title at site No. 1, not planted to a grass-legume mixture, is strongly recommended using small-grain and feed-grain crops.

Any clearing above the sediment pool should be avoided. It is realized that some clearing may be necessary within the sediment pool; however, any trees and brush that could be retained in the

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sediment pool would be of benefit to the fisheries and several species of wildlife.

All borrow areas which would be inundated should be reseaded to a fast-establishing cover to enhance fisheries in accordance with Soil Conservation Service recommendations. Any borrow areas above the sediment pool should be reseaded to the same grass-legume mixture utilized on the dam and spillway to benefit wildlife.

The Sand Creek Watershed Board is encouraged to incorporate any odd areas resulting from dam and spillway construction, impoundment, or fencing, into the permanently fenced area in order to provide additional wildlife habitat. Special consideration should be given to those areas designated by the small encircled letters "a" and "b" on the structure site maps for sites Nos. 2 and 3, as shown on Plates 3 and 4.

Tree and shrub plantings for enhancement are suggested at the locations designated as "E" on the maps for sites Nos. 2 and 3. Similar enhancement plantings also should be considered for areas at structure site No. 1 not labeled as mitigation. Other tree and shrub plantings are strongly recommended on odd areas not used for cropland or pasture at sites Nos. 2 and 3. The same recommendation made for tree and shrub plantings for mitigation apply to these enhancement plantings.

Existing native grass pastures on site No. 1 should not be grazed but given the opportunity to become fully reestablished. During the reestablishment period, no grazing, haying, burning, or mowing should be permitted. After reestablishment, grazing, haying, burning, or mowing should occur only as deemed necessary to maintain the pastures in optimum condition for wildlife usage.

For such clearing that is performed, the resulting brush should be piled at or near the flood-pool elevation in lieu of burning, wherever possible. These brush piles should be located primarily on pastureland or on odd areas not generally farmed. If the clearing occurs within a reasonable distance of the dam and spillway at sites Nos. 2 and 3, the brush should be piled in such a way as to be included within the area to be fenced. These brush piles should be no larger than 30 feet in diameter, nor piled higher than 10 feet. A minimum distance of 150 feet between brush piles would be desirable.

Enhancement measures for fish and wildlife management and public use of the multiple-purpose area at site No. 1 are needed to realize the fish and wildlife potentials.

The entire acreage acquired in fee title should be fenced to regulate public access, restrict trespass grazing, and to properly identify the boundary line between public and private lands.

Past experience by the Kansas Forestry, Fish and Game Commission on areas of this size and location has shown that regulated public hunting is compatible with other types of recreation. If hunting is permitted, the area will receive additional public use of a valuable natural resource. Certain regulations may be desirable such as restricting use of firearms to shotguns only. Also, hunting could be prohibited on all or part of the area until the waterfowl season opens, or about mid-October. This would reduce conflicts such as may occur between early season hunting and late season use by other recreationists.

Several points conveniently located around the reservoir perimeter should be designated as access areas with provisions made for parking areas and other facilities. It also may be beneficial to provide several trails into portions of the area. Again, provision should be made to restrict vehicles to these trails or to defined parking areas along the trails. Uncontrolled vehicular access to all portions of the reservoir lands should be avoided to reduce losses of wildlife habitat, and to reduce or at least concentrate the inherent problems of trash clean-up.

We understand that funding for installation of the mitigation features would be on the same basis as the project measures that caused the habitat loss, and that the project sponsors would operate and maintain the measures to serve their intended wildlife purposes for the life of the project.

Multiple-purpose site No. I would include additional land and other features and facilities that would serve recreational purposes including fish and wildlife. The additional costs of these enhancement features would be cost-shared equally by the Federal Government under Public Law 566 and the Soil Conservation District in cooperation with the town of Newton. Several measures, suggested in this report and itemized in Recommendation No. 4 which follows, would result in additional fish and wildlife benefits without significantly increasing project costs and would not need to be cost-shared.

The mitigation and enhancement measures were discussed with the Board of Directors of Sand Creek Watershed on March 2, 1972, by Mr. Darrell Montei of the Kansas Forestry, Fish and Game Commission. The Board approved the mitigation and enhancement measures,

as shown by the enclosed copies of a letter to State former Conservationist Lee T. Morgan from Ardith Sauerwein, President of Sand Creek Watershed, and the transmittal of the Minutes of the Sand Creek Watershed District meeting of March 2, 1972.

In view of the above, it is recommended that:

- 1. Replacement of wildlife habitat lost as a result of the project be accomplished by following the mitigation measures for each structure-site area as approved by the Board of Directors of the Sand Creek Watershed Joint District No. 68 on March 2, 1972, and as itemized below:
  - a. Fencing of wildlife areas.
  - Seeding of dam, spillway, and certain wildlife areas to a grass-legume mixture having wildlife value.
  - c. Leaving existing cover whenever and wherever possible.
  - d. Planting trees and shrubs.
  - e. Sharecropping cropland within the mitigation area of site No. 1.
- 2. All measures installed for mitigation of losses of wildlife habitat be maintained by the project sponsors for the life of the project.
- 3. The tree and shrub plantings installed as mitigation measures be maintained at a 75 percent survival rate for the first 5 years, and thereafter be managed to allow for desirable natural growth and reproduction.
- 4. The project sponsors and individual landowners in the watershed be encouraged by the Soil Conservation Service to carry out the following measures intended to enhance fish and wildlife:
  - a. Planting of switchgrass within a 2-foot vertical elevation of the sediment pool.
  - b. Leaving unharvested grain as food for wildlife at sites Nos. 2 and 3 and sharecropping cropland at site No. 1.
  - c. Minimum clearing, and leaving as much vegetation in the sediment pool as reasonably possible.

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- d. Reseeding borrow areas.
- e. Including odd areas for wildlife habitat.
- f. Planting trees and shrubs for improvement of wildlife.
- g. Allowing the native grass pastures at site No. 1 to become fully reestablished.
- h. Constructing brush piles.
- i. Fencing the entire acreage acquired in fee title at site No. 1.
- j. Allowing hunting at site No. 1.
- k. Providing adequate points of public access to the reservoir perimeter at site No. 1.
- 5. Landowners be advised of cost-sharing opportunities which may be available to them for the inclusion of various fish and wildlife developments on their lands through participation in Soil Conservation Service programs. Landowners also should be advised of technical assistance available through the Kansas Forestry, Fish and Game Commission.

By following Recommendations Nos. 1, 2, and 3, wildlife habitat lost as a result of the project will be replaced and maintained for the life of the project.

By following Recommendations Nos. 4 and 5, wildlife habitat in the area would be increased, resulting in benefits to wildlife and the project.

The above recommendations are in conformance with USDA Soil Conservation Service Watersheds Memorandums - No. 101 and No. 102, dated January 30 and May 1, 1970, respectively. If adopted as part of the plan of project development, fish and wildlife habitat would be replaced to the extent necessary to prevent wildlife loss.

If the project is authorized as planned, the Bureau of Sport Fisheries and Wildlife and the Kansas Forestry, Fish and Game Commission will be available to provide further technical assistance to your Service and the project sponsors in carrying out the wildlife mitigation and enhancement measures.

The cooperation of your staff in the field studies and in providing pertinent data relating to the project is appreciated.

Sincerely yours, .

Regional Director

Enclosure

Copies (7)

Distribution:

- (5) Director, Kansas Forestry, Fish and Game Commission, Pratt, Kansas
- (1) President, Sand Creek Watershed Joint District No. 68, Route 4, Newton, Kansas
- (1) Chairman, Harvey County Soil Conservation District, Route 5, Newton, Kansas
- (1) Chairman, Marion County Soil Conservation District, Route 3, Peabody, Kansas
- (1) Representative, MBIAC, SCS, Lincoln, Nebraska
- (1) Regional Biologist, SCS, Lincoln, Nebraska
- (1) Special Asst. to the Secretary, USDI, Mo. Basin Reg., Denver, Colorado
- (2) Regional Director, BOR, Mid-Cont. Reg., Denver, Colorado
- (2) Regional Administrator, EPA, Reg. VII, Kansas City, Missouri
- (3) Area Office Manager, BSFW, Kansas City, Missouri

Box 600, Salina, Kansas 67401

August 23, 1973

Mr. W. O. Melson, Jr.
Regional Director
Fish and Wildlife-Service
Bureau of Sport Fisheries and Wildlife
P. O. Box 1306
Albaquerque, New Mexico 87103

Dear Mr. Nelson:

Tour letter report for the Sand Creek Watershed in Harvey and Marion Counties, Kansas is hereby acknowledged. It is our intention to make full use of this report when installing the project following its authorization.

We would like to call your attention to a misleading statement in the last paragraph on page 3. The 1968 Preliminary Investigation Report erroneously identified 1,173 acres of woodland. The woodland acreage was later set at 300 acres in the November 1970 Forestry Work Plan. This kind of inconsistency commonly occurs because of the difficulty in differentiating between woody pasture and true woodland. The last sentence of this paragraph is therefore incorrect since land use conversions are not the reason for the difference between the 1968 and 1970 figures. We trust this explanation will clear up any confusion that might exist.

The cooperation of your staff is appreciated. I am looking forward to the continuation of this cooperation in completing the planning job on Sand Creek and other watersheds.

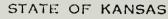
Sinceraly yours,

Robert K. Griffin

State Conservationist

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G. K. Phenicie, Kansas City, Missouri





# Forestry, Fish and Game Commission

Build a Pond Plent a Bush Grow a Trees

Box 1028 PRATT, KANSAS 67124

March 26, 1973

Mr. William M. White
Acting Regional Director
Burcau of Sport Fisheries and Wildlife
P. O. Box 1306
Albuquerque, New Mexico 87103

Dear Mr. White:

Enclosed is a copy of the draft of the Bureau of Sport Fisheries and Wildlife report dated March 5, 1973, on the Sand Creek Watershed, Kansas.

The comments of my staff appear throughout the text. When the necessary additions, deletions and corrections have been made we will be able to concur with the report.

Your cooperation in this matter is appreciated.

Sincerely,

Richard D. Wettersten

Director

RDW:DJD:hfp

Enclosure



#### SAND CREEK WATERSHED JOINT DISTRICT 68

500 Meridian Road

Telephone AT 3-3760

Newton, Kansas 67114

March 7, 1972

Mr. Lee T. Morgan, State Conservationist Soil Conservation Service Box 600 Salina, Kansas 67401

Dear !Ir. Horgan:

inclosed please find a copy of our March 2nd Sand Creek Water-shed meeting minutes. On our recreation structure site we approved the mitigation plantings, as recommended by Darrel Montei, of the Fish and Game Commission. We are also planning to add some enhancement plantings.

If other information or assistance is needed in developing the General and Work Plan please let us know.

Sincerely yours,

ardith Somerum

Ardith Sauerwein, President Sand Creek Watershed

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# Sandcreek Watershed Dist. 68 Minutes March 2, 1972 8:00 p.m.

Present: Ardith Sauerwein, president presiding; Fred Ice; Burt Green, Ed Harms; Orville Schmidt; Alvin Goerzen; Dan Epp; Wilbur Sauerwein, Richard McGlachlin, Ed Stahl.

Minutes of the previous meeting were read and approved.

The term "Outdoor Laboratory" was explained by President Sauerwein.

Sponsorship of recreational development sites: (Specifically site 9-3) President Sauerwein briefed the board on the public relations work that has been done in this connection and announced that Newton City has agreed to sponsor Recreation Site 9-3. Further discussion indicated that North Newton City should also be invited to cosponsor Site 9-3.

A REAP dam site above the Peters property: It was moved that a REAP dam be constructed above dam 8-11

Schmidt and Brubacher-Carried

We recommended that two REAP dams be constructed in Newton township sections two and three - one in each section.

W. Sauerwein and Harms--Carried

We recommended that a REAP dam be constructed on Newton township section 10.

Stahl and McGlachlin--Carried

Mitigation of Wild Life: Moved that we approve the recommendation on mitigation and enhancement by Darrell Montei.

Brubacher and Schmidt--Carried

Moved that we approve the fee title area proposed but that we increase the proposed fee title area from 970 to 1200 acres on the multi-purpose recreational site.

Brubacher and Goerzen--Carried

Moved that we approve the proposed recreational facilities on the multi-purpose recreational site.

McGlachlin and Brubacher--Carried

Land Management on the Multi-purpose Recreational Site: Moved that we cooperate in the development of land use and development of the Land Management Program.

W. Sauerwein and Brubacher--Carried

The State Watershed meeting March 7 at the Ramada Inn: President Sauerwein urged the board to attend as much of the day's meeting as possible.

Sandcreek Watershed Dist. 68 - Minutes Page 2

Moved that we order 1200 conservation church bulletin inserts to be distributed to local churches.

Goerzen and Schmidt--Carried

Bills: Dale Perkins, 20 hours @\$2.51 per hour = \$50.20 Moved to pay all bills.

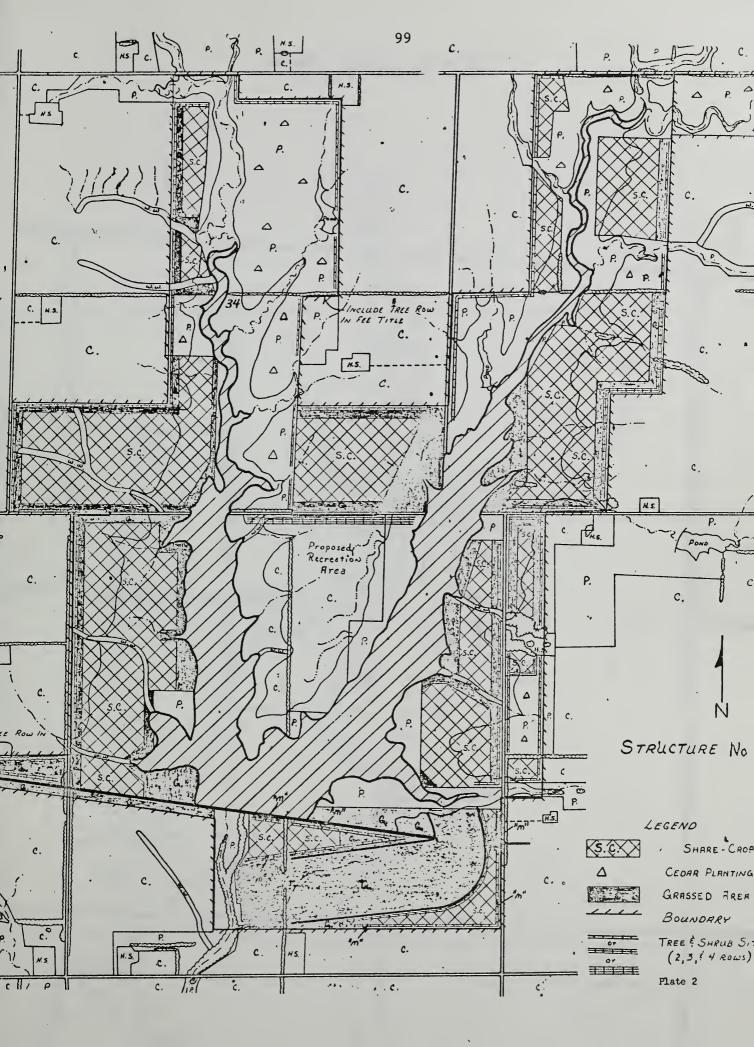
Brubacher and Stahl--Carried

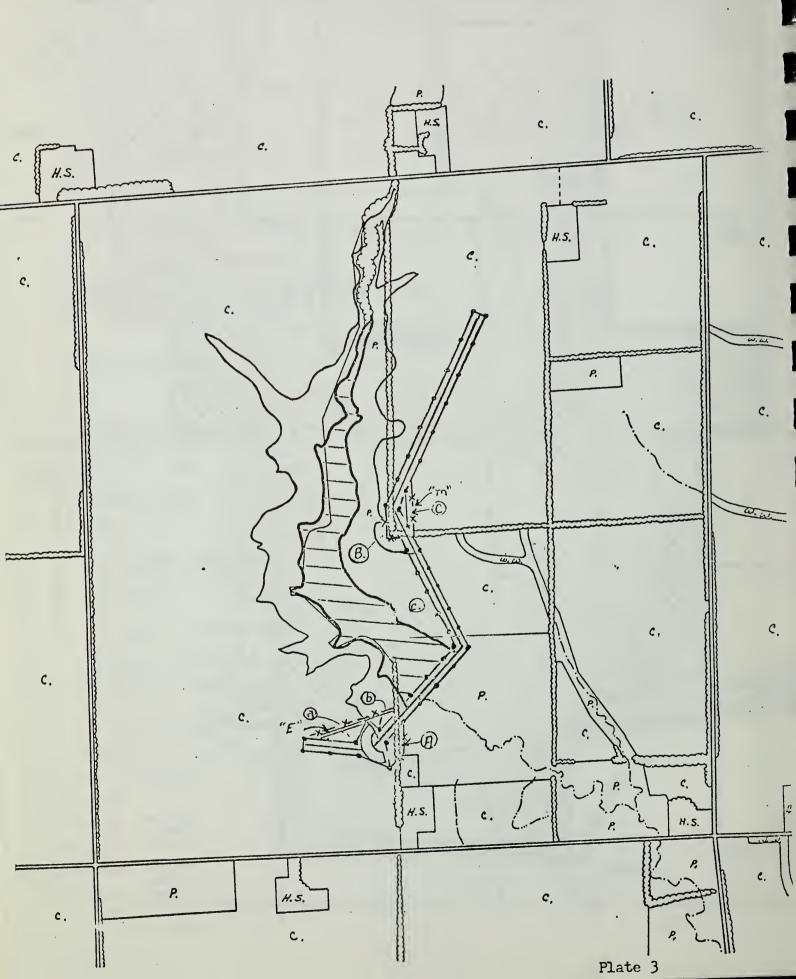
Meeting was adjourned by President Sauerwein.

Dan Epp, recorder

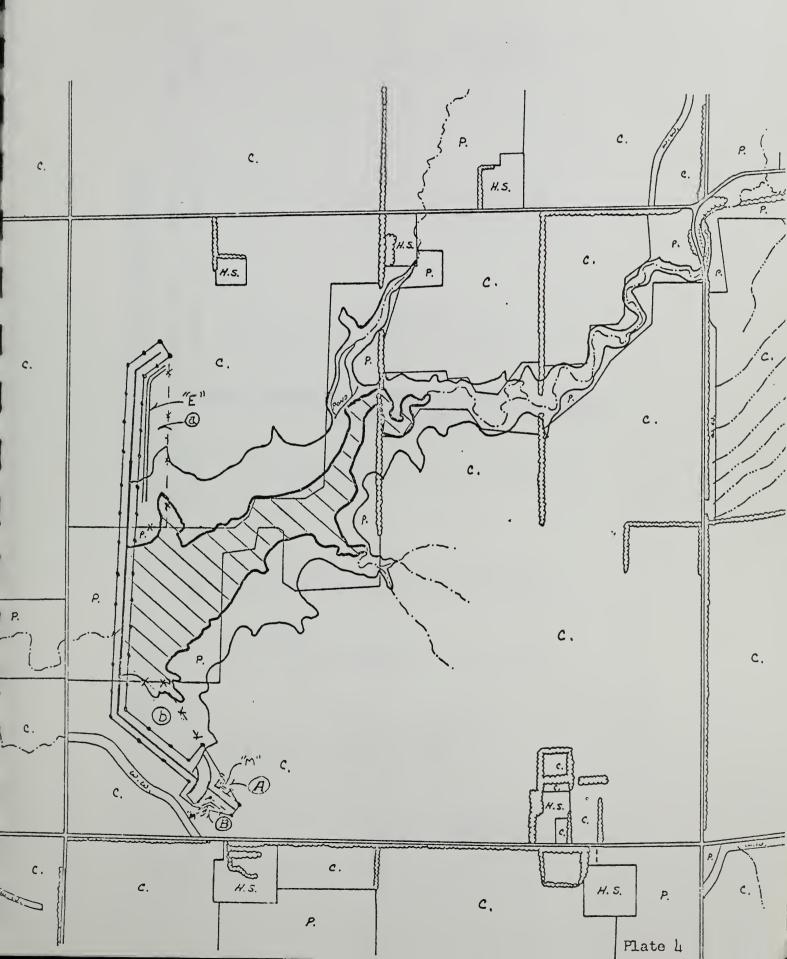
### LEGEND

PERMRNENT POOL	$V//\lambda$
FLOOD POOL	
AXIS OF DAM	3)
SPILLWAY -	/ •
STANDARD S.C.S. FENCE	
LOCATION	OR +-+-+
SUGGESTED FENCE LOCATION	
(MITIGATION) (B) (C)	<del>-x - x - x - x - x - x - x - x - x - x </del>
SUGGESTED FENCE LOCATION	
(ENHANCEMENT) 3 6	* * * *
TREE ROW OR TIMBER AREA	
H.S.	House SITE
RAILRORD	<del></del>
TRAIL	
BRUSH PILES	0 0 0 0
ROAD	-
TREE PLANTING "M"	MITIGRTION
TREE PLANTING "E"	ENHRNCEMENT
W. W.	WATER WRY
TERRACE	
CREEK OR RIVER	
P.	PRSTURE
C.	CROPLAND
<b>الله</b> .	WASTELAND OR ODD AREA
POND	
CEMETRRY	T Plate 1





# STRUCTURE No. 3



#### APPENDIX B

CHEMICAL ANALYSES OF GROUND WATER (WELLS) IN THE SAND CREEK WATERSHED

CHEMICAL ANALYSES OF GROUND WATER (WELLS) IN THE SAND CREEK WATERSHED

Sodium (Na) (mg/l)	22	36	34	33	22	31	36	51	41	43	63	. 99	24ª/	$110^{a}$	220ª/	$110^{a}$	20 <del>a</del> /
Magnesium (Mg)	9.3	7.7	8.6	7.8	8.2	23.0	25.0	20.0	6.1	6.7	12.0	10.0	7.7	<b>7.</b> 9	200.0	0.89	20.0
Manganese (Mn)	0.00	00.00	00.00	00.00	00.00	0.36	0.23	0.91	00.00	0.00	0.14	0.00	0.00	00.00	00.00	!	0.91
Calcium (Ca) (mg/ $\ell$ )	77	99	58	61	45	125	138	117	38	45	98	98	37	42	480	170	120
Iron (Fe)	0.18	0.05	0.15	0.13	0.03	0.20	0.15	0.79	0.03	0.53	0.03	0.05	90.0	0.03	0.08	0,40	0.79
	Avg 150	52	64	102	30	30	28	28	35	35	94	100	119				
Location	Newton	Newton	Newton	Newton	Newton	Sedgwick	Sedgwick	Sedgwick	Walton	Walton	Goessel	Goessel					
Well Identity	1	2	3	4	11	9	7	<b>∞</b>	East Well	West Well	Well No. 1	Well No. 2	22 1E 36AA	22 1E 36AB	23 1E 22BA	24 1E 7AAB	24 1W 33DAC

Fluoride (F) Nitrate (NU3) $(mg/k)$			0.1 7.1		0.1 12.0	0.2 24.0	0.3 8.8	0.2 1.8					0.3 33.0				170.0
			22 0.1	18 0.1				29 0.2							170 1.1		
(mg/k)	34	32	29	35	16	86	108	100	18	17	32	31	26	20	2,100	280	
(HCO <sub>3</sub> ) (mg/k)	163	264	227	237	193	373	420	410	159	154	388	390	129	200	132	276	
(mg/g)	2.5	1.9	2.2	1.3	1.7	2.0	2.2	3.1	1.8	2.2	1.8	1.9	;	!	:		
Identity	1	2	3	4	11	. 9	7	00	East Well	West Well	Well No. 1	Well No. 2	22 1E 36AA	22 1E 36AB	23 1E 22BA	24 1E 7AAB	

Total	Phosphate $(P0_4)$	(mg/k)	0.64	0.26	0,34	0,34	09*0	0,30	0.29	0.41	0.67	1.50	0.10	0.21	i	;	i	E 3	
Total	Alkalinity	(CaCO <sub>3</sub> ) (mg/ <i>l</i> )	134	216	186	194	158	306	344	336	130	126	318	320	g I	i i	1 1	!	;
	(mg/k)	Noncarbonate	14	0	0	0	0	100	104	38	0	14	0	0	18	0	1,900	480	38
	Hardness $(CaCO_3)$ $(mg/k)$	Carbonate	134	196	180	184	146	306	344	336	120	126	264	256	102	120	100	220	332
	Harc	Tota1	148	196	180	184	146	406	448	374	120	140	797	256	120	120	2,000	200	370
Total	Solids	(mg/lg)	243	320	295	304	232	244	580	545	257	291	451	456	;	;	;	1	1 1
Dissolved	Solids	(mg/lg)	1	!	1	i	!				i	:	!	!	225	426	3,210	1,130	545
	We11	Identity	1	2	3	4	11	9	7	8	East Well	West Well	Well No. 1	Well No. 2	22 1E 36AA	22 1E 36AB	23 1E 22BA	24 1E 7AAB	24 1W 33DAC

Source: Kansas State Department of Health, Topeka, Kansas (Personal Communication) 1974.

 $\underline{a}$ / Sodium + Potassium Ion.

## APPENDIX C

KANSAS STATE BOARD OF HEALTH REGULATIONS

# WATER QUALITY CRITERIA FOR INTERSTATE AND INTRASTATE WATERS OF KANSAS

Water quality criteria are listed herein for all surface waters of the state, both interstate and intrastate, including all tributary water courses. All waters of the state whose existing quality is better than the applicable water quality criteria as established herein as of the date the water quality criteria become effective will not be lowered in quality until it has been determined by the Kansas State Board of Health that the change is justifiable as a result of necessary social and economic development and that all beneficial uses of waters affected will not be impaired. In no case shall the quality of waters of the state be reduced below the quality criteria as established herein.

### I. WATER USE CLASSIFICATION

Water use classifications for all waters of the state are listed in Section IX of the criteria. Water uses are grouped into the following two categories:

## A. Class A Waters Shall Be Protected for the Following Water Uses

- 1. Body contact recreation. These waters are intended for uses where the human body may come in direct contact with the raw water to the point of complete submergence with the possibility of ingestion, such as swimming, water skiing, and skin diving.
- 2. The preservation and propagation of desirable species of fresh warm-water aquatic biota, semi-aquatic life, waterfowl, and wildlife.
  - 3. Public water supply.
  - 4. Industrial water supply.
  - 5. Agricultural purposes.

## B. Class B Waters Shall Be Protected for the Following Water Uses

- 1. Secondary contact recreation. These waters are intended for uses such as fishing, wading, boating, or other activities where ingestion of the water is not probable.
- 2. The preservation and propagation of desirable species of fresh warm-water aquatic biota, semi-aquatic life, waterfowl, and wildlife.
  - 3. Public water supply.
  - 4. Industrial water supply.
  - 5. Agricultural purposes.

### II. TREATMENT REQUIREMENTS

A minimum of secondary treatment shall be provided for all municipal wastes by July 1, 1977. Best practicable control technology currently available shall be applied to all industrial wastes by July 1, 1977. The objective of treatment or control will be to reduce the organic load, oil, grease, solids, alkali, acids, toxic materials, color and turbidity, taste and odor products, and other deleterious materials to the lowest practicable level.

Seasonal disinfection (April 1 through October 31) of treated wastes shall be provided for those municipalities or industries which contribute bacterial loadings to rivers or streams which are tributary to waters used for body contact recreation and which waters are within the zone of bacterial influence.

### III. FLOW CRITERIA

The water quality criteria for all waters shall apply at all times except during periods when streamflows are less than the average minimum 7-day flow which occurs once in 10 years, or when streamflow is less than 1 cfs, whichever value is greater.

Quality criteria will be met insofar as is practicable when streamflows are less than those stipulated.

### IV. MIXING ZONES

The water quality criteria listed herein shall apply below the mixing zone for each individual discharge. The total area and/or volume of a receiving stream assigned to mixing zones shall be limited to that which will: (1) not interfere with biological communities or populations of important species to a degree which is damaging to the ecosystem; and (2) not diminish other beneficial uses disproportionately.

## V. ZONES OF PASSAGE

Zones of passage must be provided in streams, reservoirs, or lakes wherever mixing zones are allowed, and such zones shall be continuous water routes of the volume, area, and quality necessary to allow passage of free-swimming and drifting organisms with no significant effects on their populations. Because of varying local physical and chemical conditions and biological phenomena, no single value can be given on the percentage of river width necessary to allow a sufficient zone of passage. As a guideline, mixing zones should be limited to no more than one-fourth of the cross-sectional area and/or volume of flow of a stream or reservoir, leaving at least three-fourths free as a zone of passage.

## VI. ANALYTICAL TESTING

All methods of sample collection, preservation, and analysis used in applying any of the rules and regulations in these standards shall be in accord with those prescribed in "Standard Methods for the Examination of Water and Wastewater," 13th edition, or other methods acceptable to the Board.

### VII. GENERAL CRITERIA

The cumulative effect of waste discharges to waters of the state will be guided by the 1962 U.S. Public Health Service drinking water standards. Pollutional substances contributed by man-made point source waste discharges shall be maintained below maximum permissible concentrations which would be detrimental for public water supplies, the preservation and propagation of desirable diversified aquatic life, recreational requirements, agricultural needs, industrial needs, and other established beneficial use. All waters shall be controlled so that public health hazards or nuisance conditions will not develop due to man-made point source discharges.

### VIII. SPECIFIC CRITERIA

## A. Bacteria

- 1. In Class A waters, the fecal coliform content based on not less than five samples taken during separate 24-hr periods over not more than a 30-day period shall not exceed a geometric mean of 200 per 100-ml sample, nor shall more than 10% of total samples during any 30-day period exceed 400 per 100-ml sample.
- 2. In Class B waters, the fecal coliform content shall not exceed 2,000 per 100-ml sample.

It is recognized that the bacterial criteria for Class A and B waters will be violated as a result of contributions from natural nonpoint sources during periods when those waters are being influenced by surface runoff.

## B. Dissolved Oxygen

- 1. In Class A waters, the dissolved oxygen content shall be maintained at or above 5 mg/liter. Dissolved oxygen concentrations less than 5 mg/liter shall not be due to man-made point source waste discharges.
- 2. In Class B waters, the dissolved oxygen content shall be maintained at or above 5 mg/liter (except for 4 mg/liter for short

periods of time within a 24-hr period). Dissolved oxygen concentrations less than the above levels shall not be due to man-made point source waste discharges.

### C. Temperature

Man-made point source discharges shall not elevate the temperature of the receiving water above 90°F. Heat of artificial origin shall not be added to a stream in excess of the amount that will raise the temperature of the water more than 5°F above natural conditions. The epilimnion of lakes shall not be raised more than 3°F above that temperature which existed before the addition of heat of artificial origin. The normal daily and seasonal temperature variations before the addition of heat due to other than natural causes should be maintained. The measurement system used in each case should provide for temperature measurements which reflect the temperature differential induced after a reasonable mixing zone. A zone of passage for free-swimming and drifting aquatic biota must be provided for the water affected by each discharge.

## D. pH

Man-made point source waste discharge shall not cause the pH of waters of the state to vary below 6.5 nor above 8.5.

### E. Ammonia

Man-made point source waste discharge shall not cause the undissociated ammonium hydroxide concentration of waters of the state to exceed 0.15 mg/liter as N.

### F. Oil and Grease

All waters shall be essentially free of visible oil and grease. Dissolved or emulsified grease concentrations shall be kept below levels which will interfere with established beneficial use.

### G. Solids

There shall be no man-made deposits of solids in waters of the state, either organic or inorganic, which will be detrimental to established beneficial use. All waters shall be free of floating debris, scum, and other floating materials attributable to municipal, industrial, or other waste disposal practices in amounts sufficient to be unsightly or detrimental to established beneficial use.

## H. Turbidity

There shall be no turbidity increase in waters of the state, of other than natural origin, that will cause substantial visible contrast with the natural appearance of the water or be detrimental to established beneficial use.

## I. Taste and Odor Producing Substances

Taste and odor producing substances from man-made point sources shall be limited to concentrations in the receiving water that will not interfere with the production of potable water by reasonable water treatment processes, or impart unpalatable flavor to fish, or result in noticeable offensive odors in the vicinity of the water, or otherwise interfere with established beneficial use of the water.

### J. Color

Man-made point source discharges of color-producing substances shall be limited to concentrations which will not be detrimental to established beneficial use of the receiving water.

## K. Toxic Substances

Toxic substances or synergistic effects of toxic substances from man-made point sources shall be limited to concentrations in the receiving water that will not be harmful to human, animal, plant, or aquatic life, or otherwise interfere with established beneficial use of the water.

## IX. DESIGNATION OF WATER USES

All water courses which reach zero natural flow annually are exempted from water use classification and the application of water quality criteria, except: (1) those waters specifically listed in the following table; and (2) those waters that can be reasonably expected to support aquatic wildlife because of pooling during periods of no flow.

Unlisted tributary watercourses which are perennial or which can be reasonably expected to support aquatic wildlife because of pooling during periods of no flow shall be classified as Class B waters.

Waters Water Use Class Neosho River Basin Neosho River ----- B John Redmond Reservoir ----- A Council Grove Reservoir ----- A Cottonwood River ----- B Marion Reservoir ----- A Chase County State Lake ----- A Spring River ----- B Shoal Creek ----- B Verdigris River Basin Verdigris River ----- B Toronto Reservoir ----- A Fall River ----- B Fall River Reservoir ----- A Elk River ----- B Elk City Reservoir ----- A Montgomery County State Lake ----- A Wilson County State Lake ----- A Woodson County State Lake ----- A Caney River ----- B Caney Creek ----- B

Little Arkansas River Basin	
Little Arkansas River	В
Lower Arkansas River Basin	
Arkansas River below Walnut Creek	В
Ninnescah River	В
North Fork Ninnescah River	В
Cheney Reservoir	A
South Fork Ninnescah River	В
Kingman County State Lake	A
Rattlesnake Creek	
Cow Creek	В
Chikaskia River	В
Medicine Lodge River	В
Salt Fork Arkansas River	В
Upper Arkansas River Basin	
Arkansas River above Walnut Creek	מ
Kearny County State Lake	
Pawnee River	
Walnut Creek	
warnut Greek	D
Walnut River Basin	
WATER REVEL BASEL	
Walnut River	B
Whitewater River	
WILLOW GOLD NAVOL	U
Cimarron River Basin	
Cimarron River	В
North Fork Cimarron River	
Crooked Creek	
Meade County State Lake	
•	
Smoky Hill River Basin	
Smoky Hill River	R
Scott State Park Lake	
Cedar Bluff Reservoir	
Kanopolis Reservoir	
Big Creek	
Chapman Creek	

Upper Republican River Basin	
South Fork Republican River	B
Arikaree River	В
Beaver Creek	
Sappa Creek	В
Prairie Dog Creek	В
North Reservoir	A
Solomon River Basin	
	_
Solomon River	
North Fork Solomon River	
Kirwin Reservoir	
South Fork Solomon River	
Webster Reservoir	
Ottawa County State Lake	
Secura Councy Deale Land	•
Lower Republican River Basin	
Republican River	
Milford Reservoir	
Lovewell Reservoir	A
Big Blue River Basin	
big blue kivel basin	
Big Blue River	В
Tuttle Creek Reservoir	
Little Blue River	
Black Vermillion River	В
Missouri River Basin	
W	_
Missouri River	
South Fork Nemaha River	_
Big Blue River	
Indian Creek	
Indian Cleck	D
Kansas River Basin	
Kansas River	В
Delaware River	В
Perry Reservoir	Δ

Wakarusa River	В
Clinton Reservoir	A
Vermillion Creek	
Soldier Creek	В
Stranger Creek	В
Mill Creek (Wabaunsee County)	В
Marais des Cygnes River Basin	
Marais des Cygnes River	В
Melvern Reservoir	A
Dragoon Creek	В
Pomona Reservoir	A
Lyon County State Lake	A
Marmaton River	В
Crawford County State Lake	A
Little Osage River	В
Saline River Basin	
Saline River	
Wilson Reservoir	A
·	

(Authorized by K.S.A. 65-165 through 65-171d; adopted 13 April 1973)

## APPENDIX D

WATER ANALYSES OF SAND CREEK (HARVEY COUNTY, KANSAS) SEVEN MILES
DOWNSTREAM FROM NEWTON, KANSAS, SEWAGE PLANT OUTFALL

WATER ANALYSES OF SAND CREEK (HARVEY COUNTY, KANSAS) SEVEN MILES DOWNSTREAM FROM NEWTON, KANSAS SEWAGE PLANT OUTFALL

Specific   Specific	_																		
Specific   Conductance   PH, Temp   Solids   Calcium,   Magnesium,   Carbonate   Bicarbonate,   Sulfate   Conductance   PH, Temp   Solids   Calcium,   Carbonate   Bicarbonate,   Sulfate   Conductance   PH, Temp   Solids   Calcium,   Carbonate   Bicarbonate,   Sulfate   Conductance   Conductanc	Chloride, (Cl)(mg/k)	32	45	53	54	57	117	57	,	cal Strep.	ints/100 m2)	3,000	2,900	3,500	3,800	3,100	2,500	1,200	
Specific   Cage   Conductance   PH,   Temp   Solids   Calcium,   Magnesium,   Carbonate   Bicar	Sulfate, (SO <sub>4</sub> )(mg/k)	87	109	112	112	130	131	134			1								
Specific   Cage   Conductance   PH,   Temp   Solids   Calcium,   Magnesium,   Carbonate	carbonate, $30_3$ (mg/ $\ell$ )	278	312	334	349	361	242	376		Fecal Coli	(Counts/10	200	1,900	< 100	< 100	< 100	< 100	100	
Cage         Conductance         PH,         Temp         Solids         Calcium,         Magnesium,           (£t)         (µΩ/cm²)         Units         °C         (mg/½)         (Ca)(mg/½)         (Mg)(mg/½)           18.8         700         7.9         14         110         85         26           18.9         800         8.5         12         65         98         7           19.0         840         8.6         12         65         104         32           19.1         860         8.4         15         65         109         35           19.1         900         7.9         17         55         109         35           19.1         910         8.0         17         55         115         33           19.2         930         8.1         17         35         117         32           19.2         930         8.1         17         35         117         32           19.2         930         8.1         17         35         117         32           10.3         19.2         116         256         2.0         6.5           10.3 <td< td=""><td>(7)</td><td></td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td></td><td>otal Colitorms</td><td>Counts/100 mt)</td><td>4,000</td><td>7,100</td><td>3,800</td><td>006</td><td>9,700</td><td>2,500</td><td>5,900</td><td></td></td<>	(7)		0.0	0.0	0.0	0.0	0.0	0.0		otal Colitorms	Counts/100 mt)	4,000	7,100	3,800	006	9,700	2,500	5,900	
Specific           Gage Conductance (ft)         pH, Temp Solids         Total (mg/l)         Calcium, (Ca)(mg/l)           18.8         700         7.9         14         110         85           18.9         800         8.5         12         65         98           19.0         840         8.6         12         65         98           19.0         840         8.4         15         65         104           19.1         860         8.4         15         65         104           19.1         860         8.4         15         65         104           19.1         910         8.4         15         65         104           19.1         910         8.0         17         55         115           19.2         930         8.1         17         35         117           19.2         930         8.1         17         35         117           (NO3)(mg/k)         (Po4)(mg/k)         Total Noncarbonate         (CaCO3)(mg/k)         (mg/k)         (mg/		9:	7	12	15	53	13	12				6.3	6.5	6.5	6.2	6.9	7.0	7.0	
Specific  Gage Conductance pH, Temp Solids  (ft) (Hil/cm <sup>2</sup> ) Units °C (mg/l)  18.8 700 7.9 14 110  18.9 800 8.5 12 65  19.0 840 8.0 12 65  19.1 860 8.4 15 65  19.1 910 8.0 17 55  19.1 910 8.0 17 55  19.2 930 8.1 17 35  19.2 930 8.1 17 35  19.2 930 8.1 17 35  19.2 930 8.1 17 35  19.2 930 8.1 17 35  19.2 930 8.1 17 35  19.2 930 8.1 17 35  10.2 3.3 3.29 92  116 3.9 372 116  15 5.2 392 118  16 5.1 400 114  17 5.8 416 120  18 5.8 416 120  18 5.0 424 226  11 5 5.0 424 116	Magne (Mg)(	2		m	m	m	m	e.	i i	BOD <sub>5</sub> ,	(mg/l)	1.0	2.0	2.8	1.0	1.5	2.5	3.0	
Specific Total Cage Conductance PH, Temp Solids (ft) (HΩ/cm²) Units °C (mg/ℓ)  18.8 700 7.9 14 110  18.9 800 8.5 12 65  19.0 840 8.0 12 65  19.1 860 8.4 15 65  19.1 910 8.0 17 55  19.1 910 8.0 17 55  19.2 930 8.1 17 35  19.2 930 8.1 17 35  19.2 930 8.1 17 35  19.2 930 8.1 17 35  19.2 930 8.1 17 18  16 3.9 372 116  15 5.2 392 118  16 5.1 400 114  12 5.8 416 120  13 5.0 424 116	Calcium, (Ca)(mg/?)	85	. 86	104	102	109	115	117	Total	Alkalınıty	(CaCO <sub>3</sub> ) (mg/l)	228	256	274	286	296	198	308	
Specific  Gage Conductance pH,  (ft) (µΩ/cm²) Units  18.8 700 7.9  18.9 800 8.5  19.0 840 8.6  19.1 860 8.4  19.0 900 7.9  19.1 910 8.0  19.1 910 8.0  19.2 930 8.1  19.2 930 8.1  19.2 930 8.1  19.2 930 8.1  19.2 930 8.1  19.2 930 8.1  19.2 930 8.1  19.2 930 8.1  19.2 930 8.1  19.2 930 8.1  19.2 930 8.1  19.2 930 8.1  19.2 930 8.1  19.2 930 8.1  19.2 930 8.1  19.2 930 8.1  19.2 930 8.1  19.3 950 920  10 5.1 400  12 5.2 424	Total Solids (mg/l)	110	65	65	65	55	55	35	aCO3)		·	92	116	118	114	120	226	116	
Specific  Gage Conductance pH  (ft) (µΩ/cm²) Uni  18.8 700 7.  18.9 800 8.  19.0 840 8.  19.1 860 8.  19.1 910 8.  19.1 910 8.  19.2 930 8.  Indian Phosphate, (NO3)(mg/t) (mg/t)  16 3.9  16 3.9  16 5.1  11 5 5.2  12 5.8  13 5.0	Temp	14	12	12	15	15	17	17	ness (Ca	(mg/x)	Nonca								
Spe Gage Cond (ft) (µΩ 18.8 7 18.9 8 19.0 8 19.1 9 19.1 9 19.2 9 19.2 9 19.1 19.2 19.2 19.2 19.2 19.2 19.2 19.2	pH, Units	7.9	8.5	8.0	8.4	7.9	8.0	8.1		1		329	372	392	400	416	454	454	
Gage (ft) 18.8 18.9 19.0 19.1 19.1 19.2 Nitrate (N03)(mg 16 15 15 11 13	ecific ductance $\Omega/\mathrm{cm}^2)$	700	800	078	098	006	910	930	Total	rnospnace,	(PO <sub>4</sub> )(mg/k	3.3	3.9	5.2	5.1	5.8	5.2	5.0	
	·								4	virrale,	103)(mg/k)	16	16	15	16	12	12	13	
									,			4-22-70	4-23-70	4-24-70	4-25-70	4-26-70	4-27-70	4-28-70	

Source: Kansas State Department of Health, 1974

WATER ANALYSES OF SAND CREEK (HARVEY COUNTY, KANSAS) SEVEN MILES DOWNSTREAM FROM NEWTON, KANSAS SEWAGE PLANT OUTFALL

Nitrate (NO <sub>3</sub> ) mg/;	33	27 28	41 29	31	Fecal Strep.	3,400	5,000	8,000
Chloride, (C1) mg/k	89 106	91 91	93	64	Fecal Coliforms Counts/100 m£	800	700 1 500	6,100 3,200
Sulfate, (SO <sub>4</sub> ) mg/£	94	/1 85	92 65	72	Total Coliforms, Counts/100 m£	57,000 91,000	63,000 74,000 18.000	564,000 118,000
Bicarbonate (HCO <sub>3</sub> ) mg/L	266	251	268 193	210	BOD Total	2.0 57		,
Carbonate, (CO3), mg/£	0.0	0.0	0.0	0.0	H <sub>3</sub> ) DO mg/k	7.0	0. 4 4. 4 7. 9	6.2
Magnesium, (Mg), mg/l	32	27	25 15	17	Ammonia Nitrogen, (NH <sub>3</sub>	.40	79.	79.
Calcium, (Ca) mg/k	66 70 63	67	67 54	62	Total Alkalinity (CaCO <sub>3</sub> ) mg/&	218 228 188	206	158 172
pH, Units	7.8	7.9	7.8	7.9	nl ness mg/k			,
Specific Conductance µΩ/cm²	920	890	930 710	200	Total Hardness (CaCO <sub>3</sub> ) mg/L	296 280 280	280	196 228
S Gage Cc	80 1.00 80	2.80	.80 1.10	06.	Total Phosphate, $(PO_4) mg/k$	22 24 18	18	17
Date	9-12-73 9-13-73 9-14-73	9-15-73	9-16-73	9-18-73		9-12-73 9-13-73 9-14-73	9-15-73	9-17-73 9-18-73

Source: Kansas State Department of Health, 1974

## APPENDIX E

WATER ANALYSES - SAND CREEK

WATER ANALYSES, SAND CREEK (NEWTON FLOOD CONTROL PROJECT)

August 7, 1969

Total Hardness (CaCO3)	222.3	:		256.2	378.2
Total Alkalinity (CaCO <sub>3</sub> )	171.0	;	171.0		
Dissolved Oxygen (mg/k)	6.0	;	4.0	5.5	5.0
Units (PH)	7.7	1	7.7	7.7	7.7
Temperature (°F)	84.0	82.0	81.0 81.5		
Depth (ft)	0.0	4.0	0.8 0.8		
<u>Location</u>	Near Dam			Broadway Street Bridge, Newton, Kansas	Main Street Bridge, Newton, Kansas

Source: Kansas Forestry, Fish, and Game Commission, 1974

# WATER QUALITY OF SAND CREEK NEAR NEWTON AND SEDGWICK, KANSAS, NEAR URBAN SEWAGE OUTFALLS

	pН	Temp	D.O.	Phosphate	Solids	(mg/l)
Location	Units	°C	$(mg/\ell)$	$\frac{(P0_4) (mg/l)}{}$	Suspended	Dissolved
Newton 1	7.2	2	11.0	0.0	30	962
2	7.6	6	7.3	3.8	72	732
3	7.4	6	9.7	3.2		600
4	7.2	6	9.6	2.4	122	554
5	7.4	4	12.8	2.5	136	708
Sedgwick 1	7.6	1	11.5	0.5	48	806
2	7.6	8	1.3	3.9	27,8	1,200
3	7.6	1	9.8	0.7	78	792
4	7.7	0	11.6	0.6	144	794
5		-				

Legend: 1 = 50 ft upstream from confluence of sewage effluent

2 = At confluence of sewage effluent

3 = 50 ft downstream from confluence of sewage effluent

4 = 200 ft downstream from confluence of sewage effluent

5 = 2,000 ft downstream from confluence of sewage effluent

Source: Nebergall and Friesen, <u>An Analysis of Sewage Treatment Plants</u>

and Receiving Streams of Harvey County, Kansas, Bethel College,

1973.

## APPENDIX F

LIVESTOCK OPERATIONS IN THE SAND CREEK WATERSHED

NUMBER OF LIVESTOCK FARM OPERATIONS AND ANIMALS PER YEAR

## LIVESTOCK OPERATIONS IN THE SAND CREEK WATERSHED NUMBER OF LIVESTOCK-FARM OPERATIONS AND ANIMALS PER YEAR

Category	<u>Dairy</u>	Hogs	Cow-Calf Herds	Feeder Animals
Marion County	(5) 274 + 200 calves	(3) 180	(8) 230 + 200 calves	(12) 142
Harvey County	(9) 670 + 600 calves	(6) 400 est.	(8 est.) 800 + 700 calves	(7) 3000

Source: Soil Conservation Service, Newton, Kansas, 1974

## APPENDIX G

FISH OF THE SAND CREEK AREA, KANSAS

## FISH OF THE SAND CREEK AREA, KANSAS

### Clupeidae

Gizzard Shad

Dorosoma cepedianum

Cyprinidae

Carp

Golden Shiner Suckermouth Minnow

Red Shiner
Sand Shiner
Plains Minnow
Fathead Minnow
Stoneroller

Cyprinus carpio

Notemigonus crysoleucas
Phenacobius mirabilis
Notropis lutrensis
Notropis stramineus
Hybognathus placitus
Pimephales promelas
Campostoma anomalum

Catostomidae

River Carpsucker

Carpiodes carpio

Ictaluridae

Black Bullhead Channel Catfish <u>Ictalurus</u> melas <u>Ictalurus</u> punctatus

Cyprinodontidae

Plains Killifish

Fundulus kansae

Centrarchidae

Largemouth Bass Green Sunfish Redear Sunfish Bluegill Micropterus salmoides
Lepomis cyanellus
Lepomis microlophus
Lepomis mocrochirus

Orangespotted Sunfish Longear Sunfish White Crappie Black Crappie Lepomis humilis
Lepomis megalotis
Pomoxis annularis
Pomoxis nigromaculatus

## Percidae

Logperch Orangethroat Darter Percina caprodes
Etheostoma spectabile

## APPENDIX H

AMPHIBIANS AND REPTILES OF SAND CREEK AREA, KANSAS

### AMPHIBIANS AND REPTILES OF SAND CREEK AREA, KANSAS

### Salamanders

Barred Tiger Salamander

Ambystoma tigrinum mavortium

### Toads and Frogs

Plains Spadefoot Toad
Rocky Mountain Toad
Great Plains Toad
Blanchard's Cricket Frog
Western Chorus Frog
Bull Frog
Leopard Frog
Western Narrow-Mouthed Frog

Scaphiopus bombifrons
Bufo woodhousii woodhousii
Bufo cognatus
Acris crepitans blanchardi
Pseudacris triseriata triseriata
Rana catesbeiana
Rana pipiens
Microhyla olivacea

### Lizards

Earless Lizard
Collared Lizard
Northern Prairie Lizard
Texas Horned Lizard
Prairie Skink
Five-Lined Skink
Sonoran Skink
Six-Lined Racerunner
Glass-Snake Lizard

Holbrookia maculata
Crotaphytus collaris collaris
Sceloporus undulatus
Phrynosoma cornatum
Eumeces septentrionalis
Eumeces faciatus
Eumeces obsoletus
Cnemidophorus sexlineatus
Ophisaurus attenuatus

### Turtles

Common Snapping Turtle
Alligator Snapping Turtle
Western Painted Turtle
Red-Eared Turtle
Ornate Box Turtle
Smooth Softshell Turtle
Spiny Softshell Turtle
Stinkpot
Yellow Mud Turtle

Chelydra serpentina

Macroclemys temmincki
Chrysemys picta belli
Pseudemys scipta elegans
Terrapene ornata ornata
Trionyx muticus
Trionyx spinifer hartwegi
Sternotherus odoratus
Kinosteron flavescens

#### Snakes

Texas Brown Snake Northern Water Snake Blotched Water Snake Graham's Water Snake Diamond-Backed Water Snake Plains Garter Snake Red-Sided Garter Snake Western Ribbon Snake Northern-Lined Snake Plains Hognosed Snake Eastern Hognosed Snake Northern Ring-Necked Snake Eastern Yellow-Bellied Racer Western Coachwhip Bull Snake Black Rat Snake Great Plains Rat Snake Western Milk Snake Great Plains Ground Snake Mole Snake

Western Massasauga Prairie Rattlesnake Speckled King Snake

Storeria dekayi texana Natrix sipedon sipedon Natrix erythrogastor transversa Natrix grahami Natrix rhombifera Thamnophis radix Thammophis sirtalis parietalis Thamnophis sauritus Tropidoclonion lineatum Heterodon nasicus nasicus Heterodon platyrhinos Diadophis punctatus Coluber constrictor flaviventris Masticophis flagellum Pituophis melanoleucus Elaphe obsoleta Elaphe guttata emoryi Lampropeltis doliata Sonora episcopa Lampropeltis calligaster rhombomaculata Sistrurus catenatus Crotalus viridis Lampropeltis getulus

Both common and scientific names were taken from the most recent and accepted scientific publications. See References 33, 46-49. Also: Anderson, Paul, <u>The Reptiles of Missouri</u>, University of Missouri Press, Columbia, Missouri (1965).

Smith, Philip W., "The Amphibians and Reptiles of Illinois," Illinois Natural History Survey Bulletin 28:1 (1961).

## APPENDIX I

BIRDS OF SAND CREEK VICINITY

## BIRDS OF SAND CREEK VICINITY

M = Migrant

SR = Summer Resident

WR = Winter Resident

PR = Permanent Resident

r = Rare or Endangered

Common Loon	Gavia immer	М
Eared Grebe	Podiceps caspicus	M
Pied-Billed Grebe	Podilymbus podiceps	SR
White Pelican	Pelecanus erythrorhynchos	M
Double-Crested Cormorant	Phalacrocorax auritus	M
Canada Goose	Branta canadensis	M
White-Fronted Goose	Anser albifrons	M
Blue Goose	Chen caerulescens	M
Snow Goose	Chen hyperborea	M
Mallard	Anas platyrhynchos	M,SR
Pintail	Anas acuta	M
Gadwall	Anas strepera	M
American Widgeon	Mareca americana	M
Shoveler	Spatula clypeata	M
Blue-Winged Teal	Anas discors	M,SR
Cinnamon Teal	Anas cyanoptera	M
Green-Winged Teal	Anas carolinensis	M
Redhead	Aythya americana	M
Canvasback	Aythya valisineria	M
Ring-Necked Duck	Aythya collaris	M
Greater Scaup	Aythya marila	M
Lesser Scaup	Aythya affinis	M
Common Goldeneye	Bucephala clangula	M
Bufflehead	Bucephala albeola	М
Ruddy Duck	Oxyura jamaicensis	M
Common Merganser	Mergus merganser	M,WR
Red-Breasted Merganser	Mergus serrator	М
Turkey Vulture	Cathartes aura	SR
Goshawk	Accipiter gentilis	WR
Cooper's Hawk	Accipiter cooperii	PR
Sharp-Shinned Hawk	Accipiter striatus	PR
Marsh Hawk	Circus cyaneus	PR
Rough-Legged Hawk	Buteo lagopus	WR
Ferruginous Hawk	Buteo regalis	WR

Red-Tailed Hawk	Buteo jamaicensis	PR
Swainson's Hawk	Buteo swainsoni	SR
Broad-Winged Hawk	Buteo platypterus	М
Harlan's Hawk	Buteo harlani	M
Golden Eagle	Aquila chrysaetos	₩R
Bald Eagle	Haliaeetus leucocephalus	r,WR
Osprey	Pandion haliaetus	M
Prairie Falcon	Falco mexicanus	r,WR
Peregrine Falcon	Falco peregrinus	r,WR
Pigeon Hawk	Falco columbarius	M
Sparrow Hawk	Falco sparverius	PR
Greater Prairie Chicken	Tympanuchus cupido	PR
Bobwhite	Colinus virginianus	PR
Ring-Necked Pheasant	Phasianus colchicus	PR
Great Blue Heron	Ardea herodias	SR
Green Heron	Butorides virescens	SR
Black-Crowned Night Heron	Nycticorax nycticorax	SR
American Bittern	Botaurus lentiginosus	SR
Whooping Crane	Grus americana	r,M
Sandhill Crane	Grus canadensis	M
Virginia Rail	Rallus limicola	SR
Sora	Porzana carolina	SR
Yellow Rail	Coturnicops noveboracensis	М
Black Rail	Laterallus jamaicensis	SR
Common Gallinule	Gallinula chloropus	SR
American Coot	Fulica americana	SR
American Avocet	Recurvirostra americana	M,SR
American Golden Plover	Pluvialis dominica	М
Black-Bellied Plover	Squatarola squatarola	М
Semipalmated Plover	Charadrius semipalmatus	M
Killdeer	Charadrius vociferus	SR
Long-Billed Curlew	Numenius americanus	М
Hudsonian Godwit	Limosa haemastica	М
Upland Plover	Bartramia longicauda	SR
Buff-Breasted Sandpiper	Tryngites subruficollis	М
Solitary Sandpiper	Tringa solitaria	М
Spotted Sandpiper	Actitis macularia	М
Willet	Catoptrophorus semipalmatus	M
Greater Yellowlegs	Totanus melanoleucus	M
Lesser Yellowlegs	Totanus flavipes	М
Stilt Sandpiper	Micropalama himantopus	М
Short-Billed Dowitcher	Limnodromus griseus	М
Long-Billed Dowitcher	Limnodromus scolopaceus	M
Pectoral Sandpiper	Erolia melanotos	М

Sanderling	Crocethia alba	М
White-Rumped Sandpiper	Erolia fuscicollis	M
Baird's Sandpiper	Erolia bairdii	М
Least Sandpiper	Erolia minutilla	М
Semipalmated Sandpiper	Ereunetes pusillus	М
Western Sandpiper	Ereunetes mauri	М
Wilson's Phalarope	Steganopus tricolor	SR
Common Snipe	Capella gallinago	М
Herring Gull	Larus argentatus	М
Franklin's Gull	Larus pipixcan	М
Bonaparte's Gull	Larus philadelphia	M
Ring-Billed Gull	Larus delawarensis	М
Forster's Tern	Sterna forsteri	М
Black Tern	Chlidonias niger	M
Domestic Pigeon	Columba livia	PR
Mourning Dove	Zenaidura macroura	PR
Yellow-Billed Cuckoo	Coccyzus americanus	SR
Black-Billed Cuckoo	Coccyzus erythropthalmus	SR
Screech Owl	Otus asio	PR
Great Horned Owl	Bubo virginianus	PR
Long-Eared Owl	Asio otus	PR
Short-Eared Owl	Asio flammeus	WR
Barn Owl	Tyto alba	PR
Barred Owl	Strix varia	PR
Burrowing Owl	Speotyto cunicularia	r,SR
Saw-Whet Owl	Aegolius acadicus	WR
Poor-Will	Phalaenoptilus nuttallii	SR
Common Nighthawk	Chordeiles minor	SR
Chimney Swift	Chaetura pelagica	М
Ruby-Throated Hummingbird	Archilochus colubris	M,SR
Belted Kingfisher	Megaceryle alcyon	SR
Yellow-Shafted Flicker	Colaptes auratus	М
Red-Shafted Flicker	Colaptes cafer	WR
Red-Headed Woodpecker	Melanerpes erythrocephalus	SR
Yellow-Bellied Sapsucker	Sphyrapicus varius	M
Hairy Woodpecker	Dendrocopos villosus	PR
Downy Woodpecker	Dendrocopos pubescens	PR
Eastern Kingbird	Tyrannus tyrannus	SR
Western Kingbird	Tyrannus verticalis	SR
Great Crested Flycatcher	Myiarchus crinitus	SR
Eastern Phoebe	Sayornis phoebe	SR
Say's Phoebe	Sayornis saya	М
Yellow-Bellied Flycatcher	Empidonax flaviventris	М
Acadian Flycatcher	Empidonax virescens	M

Traill's Flycatcher	Empidonax traillii	M
Least Flycatcher	Empidonax minimus	М
Eastern Wood Pewee	Contopus virens	M
Western Wood Pewee	Contopus sordidulus	M
Olive-Sided Flycatcher	Nuttallornis borealis	M
Horned Lark	Eremophila alpestris	PR
Barn Swallow	Hirundo rustica	SR
Cliff Swallow	Petrochelidon pyrrhonota	SR
Tree Swallow	<u>Iridoprocne</u> <u>bicolor</u>	M
Bank Swallow	Riparia riparia	SR
Rough-Winged Swallow	Stelgidopteryx ruficollis	SR
Purple Martin	Progne subis	SR
Blue Jay	Cyanocitta crisata	PR
Black-Billed Magpie	Pica pica	WR
Common Crow	Corvus brachyrhynchos	PR
Black-Capped Chickadee	Parus atricapillus	PR
Red-Breasted Nuthatch	Sitta canadensis	WR
Brown Creeper	Certhia familiaris	WR
House Wren	Troglodytes aedon	SR
Bewick's Wren	Thryomanes bewickii	PR
Rock Wren	Salpinctes obsoletus	SR
Long-Billed Marsh Wren	Telmatodytes palustris	SR
Short-Billed Marsh Wren	Cistothorus platensis	М
Mockingbird	Mimus polyglottos	PR
Catbird	Dumetella carolinensis	SR
Brown Thrasher	Toxostoma rufum	SR
Robin	Turdus migratorius	PR
Wood Thrush	Hylocichla mustelina	SR
Hermit Thrush	Hylocichla guttata	М
Swainson's Thrush	Hylocichla ustulata	М
Gray-Cheeked Thrush	Hylocichla minima	М
Veery	Hylocichla fuscescens	М
Eastern Bluebird	Sialia sialis	PR
Blue-Gray Gnatcatcher	Polioptila caerulea	SR
Golden-Crowned Kinglet	Regulus satrapa	WR
Ruby-Crowned Kinglet	Regulus calendula	М
Water Pipit	Anthus spinoletta	М
Sprague's Pipit	Anthus spragueii	М
Cedar Waxwing	Bombycilla cedrorum	WR
Loggerhead Shrike	Lanius ludovicianus	PR
Starling	Sturnus vulgaris	PR
Black-Capped Vireo	Vireo atricapilla	r,SR
Solitary Vireo	Vireo solitarius	M
Bell's Vireo	Vireo belli	SR
Red-Eyed Vireo	Vireo olivaceus	SR
-,		DIC

Warbling Vireo	Virco gilvus	SR
Black and White Warbler	Mniotilta varia	M
Tennessee Warbler	Vermivora peregrina	М
Orange-Crowned Warbler	Vermivora celata	M
Nashville Warbler	Vermivora ruficapilla	М
Yellow Warbler	Dendroica petechia	SR
Magnolia Warbler	Dendroica magnolia	М
Myrtle Warbler	Dendroica coronata	М
Black-Throated Green		
Warbler	Dendroica virens	М
Chestnut-Sided Warbler	Dendroica pensylvanica	M
Bay-Breasted Warbler	Dendroica castanea	М
Blackpoll Warbler	Dendroica striata	М
Ovenbird	Seiurus aurocapillus	М
Northern Waterthrush	Seiurus noveboracensis	M
Yellowthroat	Geothylpis trichas	SR
Yellow-Breasted Chat	Icteria virens	SR
Mourning Warbler	Oporornis philadelphia	М
Wilson's Warbler	Wilsonia pusilla	М
American Redstart	Setophaga ruticilla	SR
House Sparrow	Passer domesticus	PR
Bobolink	Dolichonyx oryzivorus	М
Eastern Meadowlark	Sturnella magna	PR
Western Meadowlark	Sturnella neglecta	PR
Yellow-Headed Blackbird	Xanthocephalus xanthocephalus	SR
Red-Winged Blackbird	Agelaius phoeniceus	PR
Rusty Blackbird	Euphagus carolinus	М
Brewer's Blackbird	Euphagus cyanocephalus	WR
Common Grackle	Quiscalus quiscula	PR
Brown-Headed Cowbird	Molothrus ater	SR
Orchard Oriole	Icterus spurius	SR
Baltimore Oriole	Icterus galbula	SR
Bullock's Oriole	Octerus bullockii	SR
Black-Headed Grosbeak	Pheucticus melanocephalus	SR
Blue Grosbeak	Guiraca caerulea	SR
Evening Grosbeak	Hesperiphona vespertina	WR
Lazuli Bunting	Passerina amoena	M
Purple Finch	Carpodacus purpureus	M
Pine Grosbeak	Pinicola enucleator	WR
Pine Siskin	Spinus pinus	WR
American Goldfinch	Spinus tristis	PR
Dickcissel	Spiza americana	SR
Rufous-Sided Towhee	Pipilo erythrophthalmus	PR
Savannah Sparrow	Passerculus sandwichensis	M
Grasshopper Sparrow	Ammodramus savannarım	M

Baird's Sparrow	Ammodramus bairdii	М
Le Conte's Sparrow	Passerherbulus caudacutus	M
Sharp-Tailed Sparrow	Ammospiza caudacuta	М
Lark Bunting	Calamospiza melanocorys	M
Vesper Sparrow	Pooecetes gramineus	M
Lark Sparrow	Chondestes grammacus	SR
Slate-Colored Junco	Junco hyemalis	WR
Oregon Junco	Junco oreganus	WR
Tree Sparrow	Spizella arborea	WR
Chipping Sparrow	Spizella passerina	SR
Clay-Colored Sparrow	Spizella pallida	M
Field Sparrow	Spizella pusilla	SR
Harris Sparrow	Zonotrichia querula	M,WR
White-Crowned Sparrow	Zonotrichia leucophrys	M,WR
White-Throated Sparrow	Zonotrichia albicollis	M
Fox Sparrow	Passerella iliaca	WR
Lincoln's Sparrow	Melospiza lincolnii	М
Swamp Sparrow	Melospiza georgiana	M
Song Sparrow	Melospiza melodia	WR
McCown's Longspur	Rhynchophanes mccownii	M
Chestnut-Collared Longspur	Calcarius ornatus	M
Smith's Longspur	<u>Calcarius</u> <u>pictus</u>	WR

## APPENDIX J

MAMMALS WITH A GEOGRAPHICAL RANGE INCLUDING THE PROJECT AREA

### MAMMALS WITH A GEOGRAPHICAL RANGE INCLUDING THE PROJECT AREA

### Didelphii

Opossum

Didelphis marsupialis

## Insectivora

Least Shrew

Short-Tailed Shrew

Eastern Mole

Cryptotis parva
Blarina brevicauda
Scalopus aquaticus

## Chiroptera

Little Brown Myotis Small-Footed Myotis Silver-Haired Bat

Eastern Pipistrel

Red Bat

Big Brown Bat Hoary Bat

Mexican Freetail Bat

Myotis lucifugus
Myotis subulatus

Lasionycteris noctivagans
Pipistrellus subflavus
Lasiurus borealis

Eptesicus fuscus
Lasiurus cinereus
Tadarida brasiliensis

### Carnivora

Raccoon

Long-Tailed Weasel

Mink

Black-Footed Ferret

River Otter Badger

Spotted Skunk Striped Skunk

Coyote Red Fox Bobcat Procyon lotor

Mustela frenata

Mustela vison

Mustela nigripes

Lutra canadensis

Taxidea taxus

Spilogale putorius

Mephitis mephitis
Canis latrans
Vulpes fulva
Lynx rufus

## Rodentia

Blacktail Prairie Dog

Thirteen-Lined Ground Squirrel

Eastern Fox Squirrel Plains Pocket Gopher

Plains Pocket Mouse Hispid Pocket Mouse Cynomys ludovicianus

Citellus tridecemlineatus

Sciurus niger Geomys bursarius

Perognathus flavescens
Perognathus hispidus

## Rodentia (Concluded)

Ord Kangaroo Rat
Plains Harvest Mouse
Western Harvest Mouse
White-Footed Mouse
Deer Mouse
Northern Grasshopper Mouse
Eastern Woodrat
Hispid Cotton Rat
Southern Bog Lemming
Muskrat
Meadow Jumping Mouse
Beaver
Prairie Vole
Norway Rat

Dipodomys ordi
Reithrodontomys montanus
Reithrodontomys megalotis
Peromyscus leucopus
Peromyscus maniculatus
Onychomys leucogaster
Neotoma floridana
Sigmodon hispidus
Synaptomys cooperi
Ondatra zibethica
Zapus hudsonius
Castor canadensis
Microtus orchtogaster
Rattus norvegicus
Mus musculus

## Lagomorpha

Black-Tailed Jackrabbit Eastern Cottontail <u>Lepus californicus</u> <u>Sylvilagus floridanus</u>

### Cervidae

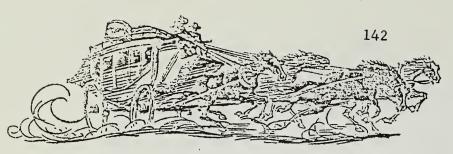
White-Tailed Deer

House Mouse

Odocoileus virginianus

#### APPENDIX K

KANSAS STATE HISTORICAL SOCIETY, AND KANSAS STATE ARCHEOLOGIST THOMAS A. WITTY



HYLE H. MILLER Executive Directo MAS, GEORGE T. HAWLEY Librarian ROBERT W. RICHMOND Stale Archivist STANLEY D. SOHL Museum Director THOMAS A. WITTY Archeologist RICHARD D. PANKRATZ Historic Sites Survey BLANCHE E TAYLOR Office Manager

EDGAR LANGSDORF Decuty Director and Transmit 172 3 Went Stra JOSEPH W. SNELL Curator, Manuscript Division 23 FURREST R. BLACKBURN Curator, Newspaper-Canaus 7053 Baba Statt.

> Fenv WPS Geh.

Stav HcBs.

November 20, 1972

Mr. Lee T. Morgan State Conservationist Soil Conservation Service, U. S. D. A. P. O. Box 600 Salina, Kansas 67401

Dear Mr. Morgan:

We have reviewed the area affected by the Sand Creek Watershed project in Marion and Harvey counties. Three buildings within the legal watershed boundaries are listed on the National Register of Historic Places: Bethel College Administration Building on the campus in North Newton, the Warkentin home at 211 East 3rd street, and the Warkentin mill at 3rd and Main in Newton. However, none of these are in areas directly affected by the construction of watershed structures. A search of our files did not locate any historic building or site which would be detrimentally affected by construction of the watershed structures.

The archeological potential of the area is discussed in the enclosed material prepared by state archeologist Thomas A. Witty.

With kindest regards and best wishes, I am

Cordially.

Executive Director

nale miller

NHM:seh Enc.

PRELIMINARY STATEMENT OF THE ARCHEOLOGICAL POTENTIAL FOR THE SAND CREEK WATERSHED, MARION AND HARVEY COUNTIES, KANSAS

#### November 20, 1972

There is no data on the location of archeological sites in the Sand Creek Watershed area. However, a number of sites were located by survey work in adjacent drainages such as Cedar creek for the proposed Cedar Point reservoir, on the Walnut river for the proposed El Dorado reservoir and south of Marion along the Cottonwood river. These finds represent cultures in the Archaic period, ca. 3000 B.C.; Middle Woodland period, 200-700 A.D.; and Protohistoric, ca. 1500 A.D. Therefore it is likely that prehistoric archeological sites also exist in the Sand Creek Watershed area.

Any such sites in an area to be altered by watershed construction or inundation would certainly be damaged or destroyed, initially by the earthmoving activity necessary for construction or later by wave, wind and current action after the pool has been flooded. We would recommend that an archeological survey be conducted in the areas of proposed construction to locate and appraise sites for salvage by scientific excavations prior to construction.

Acres 100 / State & At 15 to served Society 10th and Jackson Streets / Topeka, Kansas 6361



PHONE (913) 296-3251

NYLE H. MILLER Executive Director EDGAR LANGSDORF Deputy Director MRS. GEORGE T. HAWLEY Librarian ROSERT W. RICHMOND State Archivist STANLEY D. SOHL Museum Director THOMAS A. WITTY Archeologist RICHARD D. PANKRATZ Historic Sites Survey BLANCHE E. TAYLOR Office Manager

JOSEPH W. SNELL Curator, Manuscript Division FORREST R. BLACKBURN Curator, Newspaper-Census Divisi

August 27, 1974

Mr. John W. Reh Soil Conservation Service U.S. Department of Agriculture Box 600 Salina, Kansas 67401

Dear Mr. Reh:

Under separate cover we are sending to you the archeological survey report of the Sand Creek Watershed by Don D. Rowlison. We have reviewed his manuscript and approve of the techniques and procedures which he employed during the survey. The notes and maps used and compiled during the survey as well as a copy of his report to you are on file here at the Historical Society.

Sincerely yours,

Thomas A. Witty State Archeologist

TAW:bl

Re: Sand Creek Watershed Harvey and Marion Counties, Kansas Site Numbers 1, 2 and 3

Mr. John W. Reh Soil Conservation Service U.S. Department of Agriculture Box 600 Salina, Kansas

Re: Preliminary Archeological Reconnaissance of Watershed Area

Dear Mr. Reh:

In compliance with Purchase Order 99-KA-SCS-76 completion of a preliminary archeological field reconnaisance for structural areas 1, 2 and 3 of the Sand Creek Watershed, Harvey and Marion Counties was achieved by August 25, 1974. This preliminary field survey provides the needed information for the general program study and/or for a project in the planning stage.

#### Area Archeological Summary

Upon receipt of the proposed plan of the Sand Creek Watershed Project preparation for a field reconnaissance was made by a review of literature from previous archeological investigations in that area. Such work to date has connected with specific local area projects such as the Marion, Cedar Point and El Dorado Reservoirs and highway corridors. Archeological evidence of pre-historic man in Kansas has demonstrated a sequence of general cultural periods beginning with a nomadic Paleo-Indian that dates somewhere between 7,000 to

12,000 years ago. These nomadic hunting groups probably consisted of family units pursuing now extinct forms of mega fauna. The characteristic attributes of this time period are associated with a generally lanceolate form of projectile point having a distinctive longitudinal thinning, known as fluting.

The second oldest cultural period in Kansas is known as the Archaic and fits into a span from 5000 B.C. to approximately 0 A.D., the sites usually consist of small camps. Archaic peoples were undoubtedly foragers, exploiting the wild fauna and flora, with evidence of a domesticated canine but still previous to the introduction of the bow and arrow and the utilization of pottery.

The Archaic sites and associated artifacts in this region are often found deeply buried in ancient terrace fills. For this reason they are frequently exposed during the construction of watershed structures throughout eastern Kansas. An archeological term that has been used to identify these complexes is the "Watershed Culture." Sites associated with the Archaic "Watershed Culture" have been discovered in projects from Chautauqua, Greenwood, Lyon and Montgomery Counties and identified by archeologists from the Kansas State Historical Society.

The University of Kansas has recently spent several seasons of scientific investigation on an Archaic site located in nearby Butler County. This investigation adds to the evidence and tool inventory of this cultural period.

Recent work in southeast Kansas has designated a more extensive population in a period ranging between 0 to 1000 A.D. as the Middle or Plains Woodland. Sites representative of the period have been Woodland identified in the nearby Cottonwood and Walnut drainages of Marion and Butler Counties.

The Woodland Period was a time of transition on the Plains with the occurrence of traits associated with the inhabitants of the Eastern and Central Woodlands of America. Horticultural practices were probably key factors in this change of life style which led to more permanent settlements and the manufacturing and utilization of primitive ceramics. Woodland peoples continued hunting with some gathering of wild flora but seemingly began to rely more and more on domesticated corn, beans and squash as a means of subsistence. Domestic horticulture in turn led to the establishment of more permanent villages and village systems which began to share a combination of cultural traits.

From around 1000 A.D. to approximately 1500 A.D. archeological evidence of the aboriginal people of this area is somewhat lacking possibly due to the absence of extensive archeological research in the area. It is suspected that the people became more reliable on horticulture and continued hunting wild game.

Preliminary field research by members of the Smithsonian Institution, the Kansas State Historical Society and Wichita State University suggest that during the sixteenth and seventeenth centuries a group known as the Little River Focus of the Great Bend Aspect occupied villages along the Cottonwood River in Marion County. These groups probably represent the ancestors of the "Quivirians" or the early Wichita villages that Coronado visited in 1541. The Indians of this time continued to rely upon horticulture with seasonal hunts away from the village areas, possibly as far away as the high plains of western Kansas. Distinct cultural traits and intertribal warfare were prevalent at this time. The lifestyle remained somewhat similar with the introduction of the horse and

Anglo trade materials until the encroachment of immigrant homesteaders and the establishment of government reservations.

#### Investigations

The areas consisting of proposed watershed structures 1, 2 and 3 were extensively surveyed on foot during a three day period in August of 1974. This survey was confined to the four sections in which these structures will be constructed. Most of the area surveyed is being utilized as pasture or cropland. Conditions for surface collecting and survey, except for certain areas of dense vegetation cover, were good due to recent precipitation.

A soil sampling coring tool was used to determine the presence of shallow evidence of subsurface cultural features and/or strata. All areas were randomly probed to a depth of at least two feet as allowed by the absence of a limestone or shale strata.

#### Structure Number 1

No surface evidence of habitational sites was observed in this projected structural and associated recreational area. There still remains, of course, the possibility of more deeply buried sites such as the "Watershed Culture" which is most often characterized by clusters of burned stone fragments. Should an area of this type be exposed by construction procedures the Archeological Division of the Kansas State Historical Society should be immediately contacted for a site appraisal.

#### Structure Number 2

No evidence of aboriginal materials was located in the reconnaissance

of this area. Application of the possibility of buried sites in this area is stated for Structure Number 1.

#### Structure Number 3

No sufficient evidence of prehistoric occupation was located in the field survey of this structure area. The only possibly significant and applicable find was one of pioneer graves with the headstones having been removed from the original burial area so as not to impair farming procedures. According to local residents this small cemetery is located somewhere in the NE 1/4, SW 1/4, NW 1/4, Sec. 11, T22S, RIE.

#### Conclusion

As a result of the preliminary reconnaissance the areas studied yielded no materials or other evidence, either on the surface or in shallow subsurface tests, to indicate the presence of archeological sites.

This concludes that the proposed project will have no adverse effects upon archeological sites or material inventories in the designated area.

Yours truly,

Don D. Rowlison Consulting Archeologist

DDR:bi

#### APPENDIX L

PLANNED LAND TREATMENT MEASURES FOR SAND CREEK WATERSHED

#### PLANNED LAND TREATMENT MEASURES FOR SAND CREEK WATERSHED

Conservation Cropping System: Growing crops in combination with needed cultural and management measures. Cropping systems include rotations that contain grasses and legumes as well as rotations in which the desired benefits are achieved without these crops.

Stubble Mulching: Managing plant residues on a year-round basis in which harvesting, tilling, planting, and cultivating operations are performed to keep protective amounts of vegetation on the soil surface.

Minimum Tillage: Limitation of cultural operations to those that are properly timed and essential to crop production and soil loss prevention.

Gradient Terrace: An earth embankment or a ridge and channel constructed parallel across a slope at a suitable spacing and with an acceptable grade.

<u>Diversion</u>: A channel with a supporting ridge on the lower side constructed across a slope.

Contour Farming: Farming sloping cultivated land in such a way that plowing, preparing land, planting, and cultivating are done on the contour. This includes following established grades of terraces, diversions, or contour strips.

Grassed Waterway or Outlet: A natural or constructed waterway or outlet, shaped or graded, and established in vegetation suitable to safe disposal of runoff from a field, diversion, terrace, or other structure.

<u>Drainage</u>: Disposal of excess water in a field by grading to reshape the land surface or by construction of a graded ditch.

Proper Grazing Use: Grazing at an intensity which will maintain enough cover to protect the soil and maintain or improve the quantity and quality of desirable vegetation. This can be accomplished by stocking at rates compatible with forage production where summer-long grazing is practical or by rotating

grazing within two or more pastures. Cropland forage to produce seasonal pasture, hay, or silage can be planned to supplement rangeland pastures.

Planned Grazing Systems: A system in which two or more grazing units are alternately rested from grazing in a planned sequence over a period of years. The rest period may be throughout the year or during the growing season of the desirable plants. Many pastures contain sufficient amounts of desirable plants to recover rapidly through periodic deferments.

Brush Management: Management and manipulation of stands of brush by mechanical, chemical, or biological means, or by controlled burning. This includes reducing excess brush and weeds to restore natural plant community balance and manipulating brush stands through selective and patterned control methods to meet specific needs of the land and objectives of the land user.

Range Seeding: Establishing adapted plants by seeding on rangeland.

<u>Pond</u>: A water impoundment made by constructing a dam or embankment, or by excavating a pit to serve as a watering facility for livestock.

<u>Detention Dams</u>: A water impoundment made by constructing a dam or embankment to regulate the rate of flow in a water course.

<u>Woodland Improvement</u>: This may include harvesting mature trees, removing poor quality or less desirable trees, and pruning the managed species.

Windbreak and Shelterbelt Planting and Renovation: Planting tree and shrub seedlings to establish new or renovate existing shelterbelts and windbreaks. Renovation may also include the removal or pruning of existing plants or the adoption of improved management practices.

Hedgerow Replacement or Renovation: Hedgerow seedlings may be planted to establish permanent field borders and add to wildlife habitat and landscape beautification.

Special Purpose Plantings: Plantings of trees and shrubs may serve as special purpose plantings for screens, sound barriers, wildlife habitat, etc.

#### APPENDIX M

FACILITIES TO BE INSTALLED AT THE RECREATIONAL DEVELOPMENT, SAND CREEK WATERSHED

A description of recreation facilities follows:

#### Access Roads

Two-way: Roads will be constructed on the contour to the extent practical. Surfaces will be gravel and equivalent in quality to all-weather county gravel roads.

One-way: A one-way circulation road is planned for the camping area. This road will be gravel and of a quality consistent with that of the two-way road.

<u>Picnic Tables</u>: Tables will have steel frames and treated wood tops and benches.

Refuse Barrels: No cost sharing is available for this item but suitable containers will be provided in numbers (generally one per campsite and one per two to three picnic tables) to adequately dispose of garbage and other refuse within the recreation area.

<u>Grills</u>: Metal grills will be waist-high and suitable for use with either wood or charcoal. One or two fireplaces will be provided for use of groups desiring to have a campfire. Fireplaces will be constructed of iron, brick, stone, or concrete.

Comfort Stations: Two comfort stations will be provided. These will have a wood exterior, and a concrete floor; two showers each for men and women will be in the campground facility only. Three toilets and two lavatories for women; and two toilets, one urinal, and two lavatories for men will be in each sanitary facility. A roof with plastic or fiberglass sky lights will be used on the campground facility.

<u>Bathhouse</u>: The bathhouse will be similar to the facility in the campground area except it will have a center "room", where swimmers' clothing may be checked by bathhouse attendants, and two open-topped areas for changing clothes.

<u>Sand Beach</u>: The beach and swimming area will be graded and shaped prior to impoundment of water in the reservoir. Twelve inches of sand will be provided over 35,000 sq ft of beach and swimming area.

Water Supply: Two to three wells will be used in providing an adequate water supply (estimated at 15,000 gpd) for recreation use. No standpipes will be required although an adequate storage tank necessary to chlorinate the water will be installed to meet public health requirements. Without a standpipe it is recognized that water will not be available for recreation use when the electrical system is inoperative.

Electrical Utilities: The extension of a nearby power supply to the recreation area by the utility company is anticipated. Buried cable will be used to all outlets. Security lighting will be provided at each sanitary facility, bathhouse, picnic and camping area.

<u>Campground</u>: Trailer spurs and tent pads will be provided. An electric outlet will be available at each trailer spur. Spurs and tent pads will be graveled. Each trailer site will have a picnic table, grill, and refuse barrel in addition to the electric outlet.

<u>Picnic Shelters</u>: A concrete slab floor will be installed approximately 20 ft  $\times$  20 ft, with steel pipe supports for a wood or plastic roof. The roof shall be slightly larger than 20 ft  $\times$  20 ft.

Boat Launching Ramps: Three ramps are planned. Ramps are to be constructed of reinforced concrete or asphalt. Graveled parking areas will be provided close to boat ramps to accommodate vehicles with boat trailers.

<u>Boat Docks</u>: These floating docks, constructed of wood and styrofoam, will be anchored adjacent to boat launching ramps.

Signs: Entrance and directional signs will be constructed from metal or wood with lettering meeting county highway standards. These will be placed at strategic locations to regulate, direct, or inform users of the area.

<u>Parking Areas</u>: They shall be of the same quality as the roads with vehicles restrained to the parking areas by mechanical barriers.

Landscaping: A landscape plan will be developed to utilize plant materials for shade, utility, and beauty.

<u>Sewage Lagoons</u>: Sewage from two comfort stations, one bathhouse, and a trailer dump station will flow into 2 two-cell lagoons. Lagoons will be located so that the sewage effluent will be discharged by gravity flow, thus eliminating the need and expense of sewage lift pumps.

### APPENDIX N

COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES

COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES (Dollars)

Sand Creek Watershed, Kansas

	Benefit	Cost	Ratio					1.4:1		1		1.3:1
	Average	Annual	Costq/					160,900 112,900 1.4:1	6	13,800		160,900 126,700 1.3:1
Average Annual Benefits <sup>4</sup> /			Total					160,900		;		160,900
			Recreation Secondary -					25,400		;		25,400
			Recreation					79,100		:		79,100
	Beneficial	Use of	Stored Water					300		;		300
	More	0ff	Project					2,800		;		2,800
		Intensive	Land Use					22,000		:		22,000
		Damage	Reduction					31,300		;	/ ۴	31,300=′
			Evaluation Unit	2 Floodwater retarding	structures and	1 Multiple-purpose	structure and	Recreational facilities		Project administration		Total

Price base: agricultural = current normalized; all other = current prices. ो व वि

In addition, it is estimated that land treatment measures will provide flood damage reduction benefits of \$31,200

 $\underline{c}/$  Secondary benefits are described on page 57.  $\underline{d}/$  Amortization - 100 years at 6-7'8% interest.

#### APPENDIX O

LETTERS OF COMMENT RECEIVED ON DRAFT
ENVIRONMENTAL IMPACT STATEMENT



#### UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII 1735 BALTIMORE KANSAS CITY, MISSOURI — 64108

February 14, 1975

Mr. Robert K. Griffin State Conservationist U.S. Department of Agriculture Soil Conservation Service P.O. Box 600 Salina, Kansas 67401

Re: Sand Creek Watershed

Harvey and Marion Counties, Kansas

Dear Mr. Griffin:

We have reviewed the Draft Environmental Impact Statement for the project identified above. The project and draft statement have been rated ER-2. This rating means the Environmental Protection Agency has environmental reservations with the project as described and requests additional information be provided in the final impact statement. The following are our comments.

#### 1. Water Quality

We have reservations with the water quality of the proposed multi-purpose reservoir. Considerable project benefits are attributed to recreation. Some of these benefits are assigned to the water-based body contact recreation which is planned for the proposed multipurpose reservoir (Structure No. 1). According to the Kansas Water Quality Standards, body contact recreation is specifically permitted in only class A waters. The draft statement indicates the proposed reservoir water will meet the class B waters criteria. We suggest the Soil Conservation Service request that the Kansas Department of Health and Environment determine if the water in the proposed multipurpose pool will be of a quality to achieve the class A waters designation. The results of the determination should be included in the final statement.

#### 2. Streamflow

The draft statement did not discuss the impact of the two floodwater retarding structures and the multiple-purpose structure on the flows in Sand Creek below the dams. The only discussion of stream flow referred

2

to the amount of water released as a result of overtopping of the spill-ways during periods of high runoff. Apparently the flows in Sand Creek are to be regulated by the Kansas Division of Water Resources. Therefore, the amount of water to be released and the duration of the releases should be provided in the final statement and these flows related to the pre-project conditions in Sand Creek.

#### 3. Alternatives

The list of alternatives to the proposed project is very complete and the effects of each alternative was presented in a comprehensive manner. However, the reason(s) for rejecting each alternative was not included in the discussion. We suggest a <u>brief</u> discussion of the reason(s) for not selecting an alternative should be included in the final statement.

Thank you for the opportunity to review this draft statement. Please provide us three copies of the final impact statement at the time it is submitted to the Council on Environmental Quality.

Very truly yours,

Edward C. West

Edward C. Vest
Environmental Impact Statement
Coordinator

cc: Mr. Melville W. Gray, P.E.
Kansas Department of Health and Environment

Mr. Guy E. Gibson Kansas Division of Water Resources

#### P. O. Box 600, Salina, Kansas 67401

February 25, 1975

Mr. N. Jack Burris
Division of Environmental Health
State Department of Health
and Environment
1st Floor, Building 740
Forbes Air Force Base
Topeka, Kansas 66620

Dear Mr. Burris:

Attached is a copy of the EPA comments on the Sand Creek Environmental Impact Statement that we discussed by telephone on February 21. As suggested by EPA we are asking your agency to determine if the water in the proposed reservoir will be of a quality to achieve the class A waters designation. We would appreciate your consideration of this question and reply by March 14, 1975. Site location and other pertinent information were forwarded to you by letter on February 19, 1974.

The following is a list of low flow measurements taken by the Water Resources Board at a point on Sand Creek above Newton and just below I35W (drainage area = 42 square miles) (SW corner Sec. 4, T23S, R1E):

Date	Discharge (cfs)
Fabruary 1070	3 40
February 1970	1.40
September 1970 April 1971	0.04
September 1971	1.50 0.17
December 1971	2.93
October 2, 1972	0.00
November 6, 1972	0.01

Jim Power thought water quality samples were taken for these measurements. Please forward a copy of these records if they exist.

N. Jack Burris - 2 -

We appreciate your assistance during planning of this project. If you have any questions regarding this request, please let me know.

Sincerely,

John W. Reh River Basin-Watershed Planning Staff Leader

Attachment

USDA-SCS: JWReh:dkl 2/26/75

State of Kansas . . . ROBERT F. BENNETT, Governor

## DEPARTMENT OF HEALTH AND ENVIRONMENT

DWIGHT F. METZLER, Secretary

Topeka, Kansas 66620



March 10, 1975

Mr. John Reh U.S. Department of Agriculture Soil Conservation Service P.O. Box 600 Salina, Kansas 67401

Dear Mr. Reh:

I am writing in response to your letter dated February 26, 1975, in which you request our determination of water quality in the proposed multi-purpose impoundment in the Sand Creek Watershed. It is our opinion that the impoundment will meet Class A Water Quality Standards except during periods of runoff. However, we do not anticipate designating the lake as a body contact area until sufficient recreational intensity is demonstrated.

Attached are copies of the laboratory reports for the samples corresponding to the low flow measurements mentioned in your letter. If we can be of further assistance, please contact us.

Sincerely,

Division of Environment

jerald a Stolenber

Gerald A. Stoltenberg

Chief, Water Data Analysis Section

GAS:ft

#### UNITED STATES DEPARTMENT OF AGRICULTURE

#### SOIL CONSERVATION SERVICE

Box 600, Salina, Kansas 67401

March 20, 1975

Mr. Edward C. Vest
Environmental Impact Statement
Coordinator
Environmental Protection Agency
Region VII
1735 Baltimore
Kansas City, Missouri 64108

Dear Mr. Vest:

Your February 14, 1975, comments on the Sand Creek Watershed draft environmental impact statement expressed environmental reservations and requested additional information. Our proposals for providing the requested information have been discussed with Mr. Bob Fenemore of your staff. The attached revised pages from the draft EIS reflect this discussion and additional coordination with appropriate state agencies. Marginal bars are included to help locate changes.

The following discussion provides additional response to your comments:

#### 1. Water Quality

The State Department of Health and Environment was contacted as suggested. Copies of our request and their response are attached. Changes on pages 14, 16 and 55 should provide reasonable assurance that water in the reservoir will meet the class A designation except during periods of runoff. The exchange of correspondence with the State Department of Health and Environment will be included in the appendix of the final EIS along with your letter of comment.

#### 2. Streamflow

Changes on pages 12 and 17 reflect additional discussion with the Kansas Division of Water Resources and are intended to clarify responsibilities regarding reservoir release during drought periods.

Changes on pages 22 and 23 should provide a clearer picture of pre-project low flow conditions in Sand Creek.

Changes on pages 55 and 56 should provide a clearer explanation of expected post-project low flow conditions.



Mr. Vest Page 2

#### 3. Alternatives

Paragraph 2 under VI. Alternatives, page 19659, of the SCS guidelines for preparation of EIS's, published in the Federal Register, Part 650, dated June 3, 1974, states in part, "Justification for the nonselection of an alternative should not be included, but the key facts should be presented to enable the reader to judge the relative merits of each alternative." We propose no changes in the alternatives discussion.

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Thank you for your cooperation and assistance in preparing this EIS. Please provide a letter of concurrence or comment on the draft EIS considering proposed revisions transmitted with this letter.

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or entire to the contract of

Sincerely,

Robert K. Griffin

State Conservationist

Attachment



#### UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
1735 BALTIMORE - ROOM 249
KANSAS CITY, MISSOURI 64108

April 9, 1975

Mr. Robert K. Griffin
State Conservationist
U.S. Department of Agriculture
Soil Conservation Service
P.O. Box 600
Salina, Kansas 67401

Dear Mr. Griffin:

Re: Sand Creek Watershed, Harvey and Marion Counties, Kansas

Thank you for providing our agency copies of portions of the revised draft statement for the Sand Creek Watershed project. Our concerns regarding this project, as expressed in our comment letter (dated February 14, 1975), have been resolved to our satisfaction. We believe the responses to our comment letter, the revisions to the draft statement and the determination by the Kansas Department of Health and Environment regarding the water quality of the multipurpose impoundment should be incorporated into the final environmental impact statement.

Very truly yours,

Edward C. Vest

Edward C. Vest
Environmental Impact Statement
Coordinator

Advisory Council On Historic Preservation

9

Mr. Robert K. Griffin State Conservationist Soil Conservation Service U. S. Department of Agriculture P. O. Box 600 Salina, Kansas 67401

1975

Dear Mr. Griffin:

This is in response to your request of December 10, 1974 for comments on the draft environmental statement (DES) and watershed work plan (WWP) for Sand Creek Watershed, Harvey and Marion Counties, Kansas. Pursuant to its responsibilities under Section 102(2)(C) of the National Environmental Policy Act of 1969, the Advisory Council on Historic Preservation has determined that your DES and WWP for this project appear adequate demonstrating compliance with Section 106 of the National Historic Preservation Act of 1966 and the provisions of Executive Order 11593, "Protection and Enhancement of the Cultural Environment," issued May 13, 1971.

However, the Council notes on page 56 of the DES and again on page 73 of the WWP that Soil Conservation Service (SCS) will contact the Kansas State Historical Society and the National Park Service if cultural remains are discovered during construction. The Council wishes to remind SCS that if such properties are determined to be eligible for inclusion in the National Register of Historic Places, SCS is required to request Council comments in accordance with the "Procedures for the Protection of Historic and Cultural Properties" (36 C.F.R. Part 800).

Should you have any questions or require any additional assistance, please contact Michael H. Bureman of the Advisory Council staff at P. O. Box 25085, Denver, Colorado 80225, telephone number (303) 234-4946.

Sincerely yours,

John D. McDermott

Director, Office of Review

and Compliance

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## United States Department of the Interior

OFFICE OF THE SECRETARY WASHINGTON, D.C. 20240

In Reply Refer To: PEP ER-74/1528

MAR 6 1975

Dear Mr. Griffin:

Thank you for your letter of December 10, 1974, requesting our views and comments on the draft environmental impact statement and watershed plan for <u>Sand Creek Watershed</u>, Harvey and Marion Counties, Kansas. Comments on both documents are presented below.

#### Comments On The Plan

The proposed project will have no effect on any existing or proposed units of the National Park System or on any eligible National Landmarks. We have noted the statement on page 73 that no historic building or sites would be detrimentally affected by the proposal. However, if any effect, direct or indirect, beneficial or adverse, is expected to occur on sites within the watershed which are listed or eligible for listing on the National Register of Historic Places, such effect should be discussed in accordance with established procedures for the protection of historic properties (36 CFR 800).

The Soil Conservation Service, Kansas Forestry, Fish and Game Commission, and Fish and Wildlife have worked very closely on the three structures funded under the P.L.566 program. As a consequence, a plan was developed to mitigate losses of fish and wildlife resources that would result from the construction of the three structures. We believe the wildlife mitigation and enhancement plans as approved by the Sand Creek Watershed Board will accomplish this as planned.

The Draft Environmental Impact Statement and Work Plan also mention 19 detention dams which are being built with Rural Environmental Conservation Program (RECP) funds through the USDA's Agricultural Stablization and Conservation Service (ASCS) as part of the land treatment program which is a necessary prerequisite for the construction of the three P. L. 566 projects. Mitigation is not an integral part of the planning for these detention dams. We consider this



a weakness of the Rural Environmental Conservation Program as administered by the ASCS. Even without the P.L. 566 project, these 19 detention dams will be constructed with RECP funds as part of the land treatment measures funded through ASCS.

We conclude that this project, as presently detailed in the work plan and the environmental statement, will have no detrimental impacts on the mineral resources of Marion or Harvey Counties, Kansas, or on the possible future development of these resources.

#### Comments On The Statement

We note (page 139) that the National Register of Historic Places has been consulted with regard to any sites within the project area. However, we suggest that further consultation be effected with the State Historic Preservation Officer in order to determine whether any sites have been added to the National Register since 1972 (the date of the letter on page 139) or may now be under consideration for inclusion.

The Preliminary Archeological Reconnaissance Survey of the Watershed Area (pages 142-146) covered structures 1, 2 and 3. However, it is unclear whether this survey included all lands to be used for adjacent recreation facilities (pages 152-154). In the event that these areas were not included in this survey, the State Archeologist should again be consulted for a recommendation pertaining to the need for further survey. Mr. Witty's recommendation should also be sought concerning the need for a survey of the 19 detention dam sites listed under "Land Treatment Measures" on page 10.

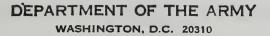
Should the above mentioned consultations and survey reveal the presence of any cultural resources that will suffer adverse impact as a result of the proposed Sand Creek Watershed project, a detailed evaluation of project impact to these resources should be compiled and included in the final environmental statement. All sources for historical and archeological information should be thoroughtly referenced in the final document.

We hope these comments will be of assistance to you in preparing your final documents.

Sincerely yours,

Deputy Maging Secretary of the Interior

Robert K. Griffin State Conservationist U.S. Department of Agriculture Soil Conservation Service P.O. Box 600 Salina, Kansas 67401





Honorable Robert W. Long Assistant Secretary of Agriculture Washington, D. C. 20250

Dear Mr. Long:

In compliance with the provisions of Section 5 of Public Law 566, 83d Congress, the Administrator of the Soil Conservation Service, by letter dated 10 December 1974, requested the views of the Secretary of the Army on the Watershed Work Plan and Draft Environmental Statement for the Sand Creek Watershed, Harvey and Marion Counties, Kansas.

We have reviewed the work plan and foresee no conflict with any projects or current proposals of this Department. The draft environmental statement is considered to be satisfactory.

Sincerely,

Charles R. Ford

Chief

Office of Civil Functions



#### DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

REGION VII
FEDERAL BUILDING
601 EAST 12TH STREET
KANSAS CITY, MISSOURI 64106
January 27, 1975

OFFICE OF THE REGIONAL DIRECTOR

Mr. Robert K. Griffin State Conservationist Soil Conservation Service Department of Agriculture P. O. Box 600 Salina, Kansas 67401

RE: Draft Environmental Impact Statement

Sand Creek Watershed

Harvey and Marion Counties, Kansas

Dear Mr. Griffin:

Thank you for the opportunity to review the above referenced document and to comment on the impact which the project has on the Department of Health, Education and Welfare programs and interests.

After review, it appears that the impacts of the proposed action and the reasonable alternatives have been adequately addressed and there are no apparent impacts on programs of the Department of Health, Education and Welfare in Region VII.

Sincerely

William H. Henderson

Regional Environmental Officer

cc: Phyllis Hayes (1)
Warren Muir (2)



## DEPARTMENT OF TRANSPORTATION UNITED STATES COAST GUARD

mailing address; u.s. coast guard (G-WS/73) 400 seventh street sw. washington, d.c. 20590 phone: (202) 426–2262

1 9 FEB 1974

Mr. Robert K Griffin State Conservationist Soil Conservation Service P. O. Box 600 Salina, Kansas 67401

Dear Mr. Griffin:

This is in response to your letter of 10 December 1974 addressed to Commandant, U. S. Coast Guard concerning a draft environmental impact statement for the Sand Creek Watershed, Harvey and Marion Counties, Kansas.

The Department of Transportation has reviewed the material submitted. We have no comments to offer nor do we have any objection to this project.

The opportunity to review this draft statement is appreciated.

Sincerely,

W.E. Caldwill

W. E. CO TWELL
Captain, U.C. The A Guard
Deputy Chief, Office of Marine
Environment and Systems
To direction of the Commandant

#### STATE OF KANSAS



# Office of the Governor State Capitol Topeka

ROBERT F. BENNETT
Governor

February 14, 1975

Mr. Robert K. Griffin State Conservationist U. S. Soil Conservation Service P. O. Box 600 Salina, Kansas 67401

Dear Mr. Griffin:

The following comments relative to your report and draft Environmental Impact Statement on the Sand Creek Watershed Joint District No. 68; the Marion and Harvey County Conservation Districts; and the City of Newton are submitted for your consideration on behalf of the State of Kansas. These comments are furnished in response to your request of December 10, 1974, and a report prepared by the Kansas Water Resources Board.

The Board advises that the proposed program of land treatment measures, the floodwater retarding structures, and the multiple-purpose structure will provide a relatively good degree of flood protection to the watershed and floodplain area of the district. These structural measures will supplement the flood protection provided by the local protection project of the Corps of Engineers for the City of Newton up to the 100-year frequency level. The multiple-purpose structure will increase recreational opportunities and provide public water-based recreation. Management of the reservoir area should provide for better wildlife and fishery opportunities.

The Water Resources Board further advised that a review of the draft Environmental Impact Statement would indicate that this document fulfills the requirements of Sec. 102(2)(c)-P.L. 91-190. Implementation of the structural and land treatment measures as proposed in the work plan will be compatible with environmental concerns of the area.

The Board of Directors of the Watershed District and the governing body of the City of Newton has signified approval of

Mr. Robert K. Griffin Page Two

the work plan as proposed in your report. The Chief Engineer, Division of Water Resources, State Board of Agriculture, acting under provisions of the Kansas Watershed District Act, has approved the general work plan as submitted by the watershed district. It should be noted that under the provisions of the same act, similar approval must be secured prior to initiation of construction of the structural measures. Also, the completed project must be operated in accordance with the state water laws.

The improvements, as set forth in the work plan, are compatible with the goals and objectives of the State Water Plan.

In view of the foregoing, I am pleased to indicate herewith my approval of the improvements as proposed in your report and urge that early action be taken in the implementation of this program.

Very sincerely,

ernor

RFB:KSK:jm

cc: Keith S. Krause Charles Bredahl A. Sauerwein

# STATE OF KANSAS



### DIVISION OF THE BUDGET

STATEHOUSE—TOPEKA 66612

February 13, 1975

Mr. Robert K. Griffin
State Conservationist
United States Department of Agriculture
Soil Conservation Service
P. O. Box 600
Salina, Kansas 67401

RE: Environmental Statement & Watershed Plan for Sand Creek Watershed Clearinghouse Number 1589-10.904(ES)

Dear Mr. Griffin:

RC

The referenced environmental statement has been processed by the Division of the Budget under its clearinghouse responsibilities described in Circular A-95.

After review by interested state agencies, it has been found that the proposed project does not adversely affect state plans. We are enclosing comments received from the State Conservation Commission, the Kansas Park and Resources Authority, the Division of Water Resources of the Board of Agriculture and the Forestry, Fish & Game Commission concerning this project for your information and referral.

Sincerely yours,

James W. Bibb

Director of the Budget

Mhill

JWB: REK: rw

Enclosure

cc: Mr. Les Jayne, Executive Director
Flint Hills Regional Planning Commission

# 179 State Clearinghouse State of Kansas

State of Kansas REQUEST FOR ACTION ON PROPOSAL (UNDER OFFICE OF MANAGEMENT AND BUDGET CIRCULAR A-95) Agency Name C. F. Bredahl - State Conservation Commission Applicant's Name Clearinghouse Number 1589-10.904(ES) U.S. Dept. of Agriculture, Soil Conservation Service Expected Filing Date Project Title Environmental Statement & Watershed Plan for Sand Creek RETURN 'G LATER THAN Return to Division of the Budget, Department of Adminis-December 31, 1974 tration, 1st Floor, Statehouse, Topeka, Kansas 66612 \*ADDITIONAL INFORMATION AVAILABLE The enclosed proposal has been submitted to the Division of the Budget under its clearinghouse responsibilities described in Office of Management and Budget Circular A-95. Your review of this proposal as it affects the interest of the state will be. appreciated. Your appropriate comments concerning the proposal) should be submitted to the Division of the Budget no later than the date specified above. Comments filed on a proposal may include: (1) the extent to which the project is consistent with or contributes to the fulfillment of comprehensive planning within the state; (2) how the proposal relates to state objectives; and (3) the effect of the proposal on your agency's activities. No Objections Request for Additional Information (discuss below) Objections (discuss below) Request for a Conference COMMENTS:

Signature

# State Clearinghouse State of Kansas

Agency Name	
Lynn E. Burris, Jr Par	rk & Resources Authority
Clearinghouse Number	Applicant's Name
1589-10.201(ES)	U.S. Dept. of Agriculture, Soil Conservation Service
Expected Filing Date	Project Title
	Environmental Statement & Watershed Plan for Sand Creel
RETURN .C LATER THAN	Potum to Division of the Pudget Department of Admini
December 31, 1974	Return to Division of the Budget, Department of Admini tration, 1st Floor, Statehouse, Topeka, Kansas 66612
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No Objections Objections	Request for Additional Information (discuss below)
(discuss below)	Request for a Conference
COMMENTS:	
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	captioned project and find it not conflicting with
We have reviewed the above	
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RC

Lynn Burris, Jr. Waysul By Wayne Herndon Signagare

Wayne Hendon

# 181 State Clearinghouse State of Kansas

	E DEC 1 1 1974 E
REQUEST FOR ACTION ON PROPOSAL	(UNDER OFFICE OF MANAGEMENT AND BUDGET CIRCULAR A-95)
Agency Name	Water Resources, Board of Agriculture
Clearinghouse Number	Applicant's Name
1589-10.904(ES)	U.S. Dept. of Agriculture, Soil Conservation Service
Expected Filing Date	Project Title
	Environmental Statement & Watershed Plan for Sand Creek
RETURN LO LATER THAN	Watershed *
December 31, 1974	Return to Division of the Budget, Department of Adminis tration, 1st Floor, Statehouse, Topeka, Kansas 66612

### \*ADDITIONAL INFORMATION AVAILABLE

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Comments filed on a proposal may include: (1) the extent to which the project is consistent with or contributes to the fulfillment of comprehensive planning within the state; (2) how the proposal relates to state objectives; and (3) the effect of the proposal on your agency's activities.

No Objections	Request for Additional Informa	tion
	(discuss below)	
Objections		
(discuss below)	Request for a Conference	

Pursuant to and in compliance with the provisions of K.S.A. 24-1213, the Directors of the Sand Creek Watershed Joint District No. 68 have prepared a General Plan. This preliminary engineering report describes the characteristics of the district, the nature and methods of dealing with the soil and water problems within the district, and the projects proposed to be undertaken. The General Plan was submitted to the Chief Engineer, and subsequently approved on August 20, 1973. The works proposed in the General Plan would alleviate floodwater and sediment damage and further the conservation, development, utilization and disposal of water within the District, thereby preserving and protecting the State's land and water resources. Detailed engineering plans of each project of work will be submitted to the Chief Engineer, Division of Water Resources for his appropriate action under the applicable statute prior to construction.

Aug Edison

# STATE OF KANSAS



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# Forestry, Fish and Game Commission



BOX 1028 PRATT, KANSAS 67124 (316) 672-6473

February 4, 1975

Mr. Robert Griffin Soil Conservation Service Som 600 Salina, KS 67401

Mr. Keith Krause Water Resources Board Fourth Floor, Mills Building Topska, KS 65612

Division of the Budget Department of Administration Attention: State Clearing House First Floor, Capitol Building Topeka, KS 06612

RE: Sand Creek Watershed

Dear Sirs:

The Forestry, Fish and Game Commission has reviewed the Draft Environmental Impact Statement and Watershed Work Plan for Sand Creek Watershed.

If the fish and wildlife mitigation and enhancement plans that are included in these plans are carried through, this may be one of the less damaging projects in the state. One point in this regard should be made, however. In the Fish and Wildlife Report (p. 86, Draft EIS) it is implied that the wildlife management area should be open to hunting, at least after mid-October. This statement should be strengthened to say the area will be open to public hunting, as this is necessary to more fully mitigate habitat losses.

Thece are a few minor errors in the reports. It states, on p. 33, that Cheney Reservoir was built by the Corps of Engineers, when actually it was built by the Eureau of Reclamation. On p. 54 a benefit is claimed for waterfowl. However, this project will not produce any waterfowl, only attract them from nearby areas. These are the same ducks that the Corps has incorrectly claimed benefits for through Marion, Cedar Point and El Dorado Reservoirs. They are not benefitted by this increase in water.

We appreciate the opportunity for previous input in these reports and for final comment.

Sincerely,

Richard D. Wetterster

Maraban

Director

RDW:RTH:jkr

P.S. Please forward an additional copy of the Draft EIS and Work Plan to Steve Capel, FF&G Office, Newton, Ks. STATE OF KANSAS

# Forestry, Fish and Game Commission



BOX 1028
PRATT KANSAS 67124
316 - 672 6473

February 27, 1975

Robert K. Griffin State Conservationist Soil Conservation Service P. O. Box 600 Salina, Kansas 67401

Dear Bob:

This is in reference to our February 4 letter forwarding comments on Sand Creek Watershed work plan and draft environmental statement. John Reh of your staff recently contacted Bob Wood concerning a statement in paragraph 2 of that letter pertaining to public hunting on the multiple-purpose structure.

After reviewing the statement and the documents under review, we concur that it is incorrect. Please strike the last three sentences in paragraph 2 of our letter.

Also, due apparently to a misreading of the environmental statement by one of my staff, our comment in paragraph 3 regarding benefits claimed for waterfowl is not correct as worded. The last four sentences in that paragraph should also be stricken. We do recognize that the impoundments will attract waterfowl and that waterfowl will use them. The point we question is that we have only so many ducks passing through this vicinity and a benefit for providing a resting area for those ducks has been claimed for at least three large reservoirs within 50 miles of the sand creek structure. With the addition of each structure, birds relocate from one to another but, the total "resting area" benefits remain the same and are not cumulative as they are now being claimed. The cumulative benefits which could be derived would be that with a more widely distributed waterfowl population, greater opportunity exists for public enjoyment of the resource.

Thank you for providing this opportunity to comment further on the Sand Creek project.

Sincerely,

Richard D. Wettersten Director

RDW:RDW:pt

cc: K. Krause
Water Res. Bd.

State Clearinghouse SC Reg. Office

# . Kansas State Mistorical Society 10th AND JACKSON STREETS / TOPEKA, KAN



### PHONE (913) 296-3251

EDGAR LANGSDORF Deputy Director MRS. GEORGE T. HAWLEY Librarian ROBERT W. RICHMOND State Archivist STANLEY D. SOHL Museum Director THOMAS A. WITTY Archeologist JOSEPH W. SNELL Curator, Manuscrip FORREST R. BLACKBURN Curator, Newspaper RICHARD D. PANKRATZ Historic Sites Survi BLANCHE E. TAYLOR Office Manager

NYLE H. MILLER Executive Director

August 14, 1974

Mr. Robert K. Griffin State Conservationist Soil Conservation Service P. O. Box 600 Salina, Kansas 67401

Dear Mr. Griffin:

We have reviewed the draft environmental impact statement and the draft work plan for the Sand Creek Watershed project in Harvey and Marion counties.

For your information, another building within the watershed was recently added to the National Register of Historic Places: the Carnegie Library at 203 Main in Newton. However, it does not lie within any of the proposed construction areas.

We have no further comments to make at this time on the historical and archeological aspects.

With kindest regards and best wishes, I am

Cordially,

Executive Director and State Historic Preservation Officer

Nyle H. miller

NHM:mf

APPENDIX P

REFERENCES AND MAPS



## REFERENCES

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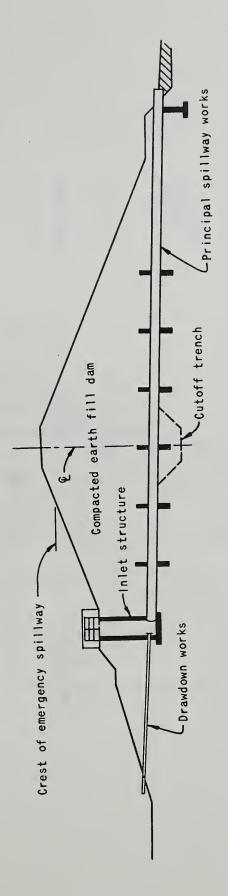
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U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

# TYPICAL EARTH DAM WITH PIPE DROP INLET



# CROSS SECTION OF DAM ON CENTERLINE OF PRINCIPAL SPILLWAY

# NOTES:

- i. FOR INDIVIDUAL STRUCTURE DATA SEE TABLE 3.
  - .. EMBANKMENT AND FOUNDATION DESIGN FEATURES NOT SHOWN.



